The MEANING OF DISEASE

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AN INQUIRY IN THE FIELD OF MEDICAL PHILOSOPHY

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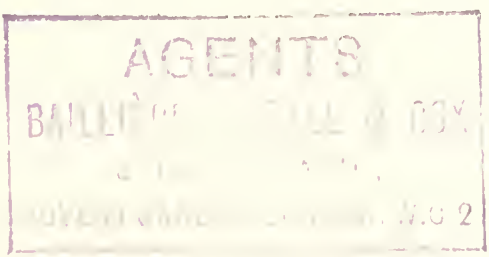

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PREFACE

> Nature must be considered as a whole if she is to be understood in detail.—*Bunge.*

> It is no paradox to say that in our most theoretical moods we may be nearest to our most practical applications.—*Whitehead.*

One of the outstanding features of the medicine of today is specialization. The movement in this direction has been rapid and all-inclusive until not only has the whole field of medicine been split up into specialties but no place has been left for the general practitioner of old. It seems obvious that for the best results analysis and synthesis should go hand in hand, analysis accumulating factual data which immediately are utilized for better and more inclusive syntheses. In medicine, however, the movement has now, for a long time, been analytic, with the production of very few synthetic minds capable of utilizing the material so accumulated.

That the growth of analytic medicine through the development of specialties has had beneficent results of outstanding importance and great magnitude no one will deny but that does not mean that there is no place for synthesis or that synthesis is not capable of results of equal importance and, too, results that analysis could never attain.

The cultivation of medical specialism has, however, been conducive to the development of as many regions of restricted viewpoint as there are specialties and in consequence a corresponding failure to envisage the human organism as a whole in any comprehensive survey of the field of medicine. The consequence is that while we are confronted with a list of diseases that is appalling in its length and discouraging in that a knowledge of them all seems out of the question for any one mind to effect, medicine is today without any adequate theory of disease as such. That this should be so seems to me to be a severe criticism of medicine for which the only answer is a frank acknowledgment

of the shortcoming and a prompt effort to supply the deficiency.

The supplying of this deficiency; namely, the formulation of a theory of disease, is just one of those generalizations that belong to the domain of philosophy. Medicine as a body of knowledge is made up of facts that belong in the fields of many sciences and inasmuch as its single objective is the delimitation and treatment of disease it is necessary that all those factors and principles which are held by these various sciences in common and which can aid in reaching this objective should be disclosed, formulated and consciously used to that end. This is obviously a problem within the province of philosophy.

It might be presumed, and properly, that in order to undertake such a task of philosophical formulation it would be well to preface the venture by an examination of the various speculations, theories, hypotheses and philosophies of the past, for there have been many, more particularly perhaps created for their assistance to a better com-

prehension of certain special problems representing only certain aspects of pathological phenomena such as tumors or fevers or more general matters such as life itself the limits of which are not by any means coterminous with pathology. Science has evolved with such startling rapidity since the middle of the last century that it does not seem that an examination of these theories, for the most part antedating this period, would be of much value in this connection.

Lest it may seem that this undertaking to set forth such a philosophical formulation and to add to the information thereby of what constitutes disease is a too ambitious undertaking let me remind the reader that, as so well stated by Whitehead:[1] "It is a well-founded historical generalization, that the last thing to be discovered in any science is what the science is really about. Men go on groping for centuries, guided merely by a dim instinct and a puzzled curiosity, till at last 'Some great truth is loosened.'"

[1] A. N. Whitehead: *An Introduction to Mathematics.*

One of the developments that has gone along with the growth of medical specialism has been the laboratory. The laboratory is an essential part of the equipment of modern medicine but it too is essentially analytic in function and its tendency is ever to discover new facts and towards increasing refinement in technique. To the extent that the laboratory has become a fetish it has interfered with the development of synthetic methods and synthetic thinking, and it is perhaps no exaggeration to say that tons of laboratory reports are accumulated each year, that are for the most part useless, in the vain hope that the laboratory man will be able to find something that can be labeled as belonging in a known category of disease.

In all this mad rush for the discovery of new facts by the analytic method and by the use of an ever refined technique there is one workshop, one laboratory so to speak, that is sorely neglected. I mean the workshop of the mind, the laboratory in which the equipment is ideas and intuitions and the processes thought processes.

This workshop of the mind is the court of last resort, the laboratory of final appeal in which sooner or later all things human must have their hearing and be verified, modified or discarded. Keyser puts it very well when he says[2]

> We may, I believe, now speak of ideas as constituting a world—the world of ideas. With that world all human beings as human have to deal—there is no escape; it is there and only there that foundations are found—foundations for science, foundations for philosophy, foundations for art, foundations for religion, for ethics, for government and education; it is in the world of ideas and only there that human beings as human may find principles or bases for rational theories and rational conduct of life, whether individual life or community life; choices differ but some choice of principles we must make if we are to be really human—if, that is, we are to be rational—and when we have made it, we are at once bound by a destiny of consequences beyond the power of passion or will to control or modify; another choice of principles is but the election of another destiny. *The world of ideas*[3] *is*, you see, *the Empire of Fate*.

I would only add that we may make our choice of principles unconsciously or

[2] Cassius J. Keyser: *Mathematical Philosophy.*

[3] Italics not in original.

consciously. In the former case we are bound by we know not what: in the latter we are bound but we know by what and are free to choose other principles when we are convinced they will better serve our purposes. It will be the function of this book to examine certain fundamental principles to the end that they may be consciously used to the best advantage, modified if need be or discarded in favor of others that offer more advantages. We may be bound by a logical fate in either instance but we are free to choose that fate which binds us in accordance with the realities rather than the fictions of life. To complete the quotation:

> Is the human Intellect, then, a slave? No: it is free; but its freedom is not absolute; it is limited by fact and by law—by the laws of thought, by the immutable characters of ideas and by their unchanging eternal relationships. Intellectual freedom is freedom to think in accord with the laws of thought, in accord with the natures of ideas, in accord with their interrelations, which are unalterable. And no variety of human freedom—no institution erected in its sacred name—if it does not conform to the eternal conditions of intellectual freedom—can stand.

The only way to attain this freedom and to advance in the path of creative evolution is to keep our thought processess and our ideas under constant conscious control. We must devote as much time and energy to a study of how best to use the marvellous powers of our minds as in the past we have devoted to the utilization of the forces of nature in our environment.

Some, perhaps much, of the material and the conclusions reached in this book will be readily recognized and will not infrequently be well known but it is my belief that even the well known material is held in mind, as a rule, rather loosely and so is frequently not available for use at times, especially, when it might be peculiarly pertinent. To accumulate this material no matter from what source or from what science and to present it as a coherent body of thought bound together by geneal principles and natural laws is believed to be a worth while object. If this object can be attained by a presentation that is at once enlightening

and which carries conviction it will serve to help to make conscious much of our thought which is now in that hazy zone more or less distantly removed from the field of awareness and the focus of attention and so render it more available for use. The effort is distinctly in line with better thinking in medicine and might very well serve its most useful purpose in supplementing a course in Medical History in the medical school curriculum. I shall not hesitate to use speculation, hypothesis, and theory to this end as I am a believer in the essential creativeness of thought as such and the usefulness of these tools, constituting an ascending scale of certainty, for finding pathways through the mists of the unknown that surround our present day knowledge.

W. A. W.

Washington, D. C.
January 24, 1926

CHAPTER 1

Disease

> He (Thomas Sydenham (1624–1689) "the English Hippocrates") held that disease is nothing more than an effort of nature to restore the health of the patient.—*Wilfred M. Barton.*

The business of medicine is the discovery, description, definition, treatment and prevention of disease. If, however, we undertake to find out what disease, using the term in its general, abstract significance, means we will find very little that is helpful. The dictionaries define it, in general, as a departure from a state of health and thereby leave us just where we were before because health is quite as vague and nebulous a term as disease which it is used to define and in turn is defined as an absence of disease. Efforts to improve this sort of definition by being more specific generally make matters worse rather than better by the introduction

of vague terms or by making unclear limitations.

By taking note of the meaning of the word as incorporated in its etymology we get some helpful hints though still of the nature of extremely vague generalities. The word is made up of two parts; namely, ease plus the privative prefix dis and so means literally a lack or absence of ease; uneasiness; pain; distress; trouble; discomfort.[1] These terms imply that their opposites; namely, ease, absence of pain; comfort are desirable and so precipitate us at once into a certain attitude toward the characteristics of the human being whether we will or no. In other words we are forced into making certain assumptions about the human being just as soon as we project any inquiry regarding him—in this case an inquiry as to the nature of disease. The conclusion seems inevitable that we must know something about the human organism if we are to have any useful, usable concept of what constitutes either its

[1] *Century Dictionary.*

health or its illness. Health and disease are states of the organism and to understand them there must be an understanding of the organism.

This matter of understanding the organism is an important one particularly because the analytic rather than the synthetic method has heretofore dictated the way. Man has been studied by medicine from various points of view. First and foremost has been the anatomical which has sought to disclose his several parts, to describe their size and form and their relations to one another; then the physiological which has sought to determine the function of each of these parts—organs. Certain refinements of these two points of view have sought to push still further our knowledge of structure and function. Thus anatomy has been supplemented by a study of the structure as seen under the microscope—histology; and physiology by a study of the chemistry of metabolism.

But the study of the organism from any or all of these points of view will never dis-

cover the meaning of the organism as such. To examine and describe the organism from these several points of view is like describing the facets of a crystal. No matter if they are all described the crystal as such has successfully escaped description. The histologist by peering through his microscope could never guess what a human being was like any more than a man walking over the surface of the earth could ever suppose that it was globe shaped. Not only must we take a different point of view to compass the entire organism but we must think about it in a different way—the synthetic rather than the analytic—and if we do this then logical fate will insure a quite different result inasmuch as we proceed in accordance with a different method.

The upshot of this whole matter is that no matter how many particular facts we may have gathered about the organism they will be of no use for a philosophical query unless we have supplemented them by a knowledge

of the organism as a whole and by the use of the synthetic method.[2]

The principle of the organism as a whole has been pretty generally accepted by biology. The whole organism is not simply the sum of all its several parts, it is much more than this, "it is not a bundle of parts but an organization of parts, of parts in their mutual arrangement, fitting one with another, in what Aristotle calls 'a single and indivisible principle of unity.'"[3]

It seems therefore that before we can speak in final terms of whether a given man is healthy or ill we must know something about what man is and that inasmuch as methods largely in use are quite incapable of giving us this information we must select others. When we have done this I suspect that we shall find that both disease and health are relative terms. I am reminded that not so long ago, and even now unfortunately, insanity and epilepsy were two

[2] See my *Foundations of Psychiatry.*

[3] D'Arcy Wentworth Thompson: *On Growth and Form.*

terms that were used as if they had a definite and final meaning much as health and disease are now. The first step towards getting away from this absolutistic method of expression was to speak of the insanities and the epilepsies. We have already come so far in the matter of disease for we have now a list of diseases the length of which is appalling. In the same way I have no doubt we shall find that health is not a unitary but a relative concept and that similarly perhaps we may find ourselves speaking of the healths. However this may be we have proceeded far enough to realize that it will be necessary to make some examination into just how we are going to approach the human organism in order that we may come to have some idea of what its healths and its diseases mean.

This is by no means a simple task. It means the examination of concepts that have been in use a long time and concepts at their face value without question. It has rarely occurred to anyone to examine them closely

or to doubt that their meaning was quite simple and self-evident. It is so with much of our thinking and it is because it is so that so much of it is poorly accomplished and leads to such faulty conclusions. A Medical Philosophy must obviously partake of the nature of philosophy in general. Its principles can only be those of philosophy which holds true in other spheres but applied to medical facts and ways of thinking in particular.

The principles of philosophic thought have been applied to science in general but little or no attention has been paid either to the application of these sciences in the field of medicine or to ways of thinking which are used in dealing with medical subjects. If medicine presented no peculiar problems of its own then perhaps a Medical Philosophy would be unnecessary but it is because I think that it does that I believe an attempt at its formulation may be of value. At least if medicine does not present peculiar problems it does present some in high relief

and with an emphasis not seen elsewhere so that it affords a peculiarly advantageous field for their study.

The conclusions of this chapter are that: disease and health are relative terms: in order to understand the nature of health and disease we must decide on just how we are to approach a study of the human organism in order to understand it in such a way as will be useful for the inquiry in hand.

CHAPTER II

Science

> The study of the relations between Consciousness and other phenomena is not only legitimate, but altogether alluring and full of promise.—*Alfred J. Lotka.*

That organized body of knowledge we call science is the place we would naturally look for those formulated concepts that might help us to that understanding approach to the human organism which we now feel necessary if we are to make even a beginning in outlining a Medical Philosophy.

One of the striking things that we come immediately to grips with when we search the field of the sciences is that no matter how we approach the study of any science ultimately we come upon certain basic concepts beyond which we cannot go and that these concepts are fundamental for that science inasmuch as not only do its methods rest upon them but the interpretation and mean-

ing of its facts also depend upon them. They are matters of common assumption and being assumed certain results inevitably follow—logical fate. For example, the properties of a triangle being what they are—by definition—then it inevitably follows that the sum of their angles is equal to two right angles.

What are some of these basic concepts? and How do they work into the fabric of medical thought? The French physicist Guye has undertaken a classification of the sciences based upon the part played in each of these fundamental, ultimate concepts. These concepts according to Guye are number, space, time, matter, life, thought. Whether these six fundamentals are well chosen or are well named is of minor importance just now. I merely wish to call attention to the principle involved and certain conclusions which issue as inevitable results. His classification[1] is given in table 1. In this scheme I should have preferred to have

[1] Ch. Eng. Guye: *Physico-Chemical Evolution.*

added energy or perhaps substituted it for matter but Guye considers matter and energy two aspects of the same thing. In fact, to quote him, "According to the principle of relativity, what are called the constituent elements of matter (molecules, atoms, electrons) are only energies, of the intimate

TABLE 1

	NUMBER	SPACE	TIME	MATTER	LIFE	THOUGHT
Arithmetic	x					
Geometry	x	x				
Kinematics	x	x	x			
Mechanics, Physics, Chemistry, Astronomy	x	x	x	x		
Biology	x	x	x	x	x	
Psychology	x	x	x	x	x	x

nature of which we know nothing. These elementary energies are of different kinds, to the number of about 80, the atoms of simple substances. But the recent discoveries of radioactivity and of isotopes, the modern researches on X-rays, tend to reduce the number of these elementary energies to

two: *the negative electron and the positive electron.*" I should have preferred, too, to have substituted the word mind for the word thought as being more general, thought being a particular function of mind.

It appears from the scheme of classification that the several sciences included are more or less arbitrary groupings of phenomena and methods. Biology for example includes the study of all living things but excludes the study of their psyche and also excludes, in consequence, the use of the methods applicable to psychological investigation as such. Each of the sciences is limited in this way so that if "to see what is general in what is particular and what is permanent in what is transitory is the aim of scientific thought."[2] then as Guye very well says "it is because we do not possess 'Science' that we have 'sciences.'"

Another fact comes out very clearly when we look at the table of classification; namely, that if we are ever to have this all-embracing

[2] Whitehead, *loc. cit.*

science we must look in the direction of the more general of the sciences rather than the less general. "There is, in fact no thought which has not experimentally a living organism for substratum; there is no living organism which is not the seat of physico-chemical phenonena; and finally there is no physico-chemical phenomenon which does not involve the conception of number, space, time, and matter."[3] It is obvious therefore that we can not seek for the explanation of life or mind in the inorganic laboratory for the very simple reason that it is not there. We must at least deal with life and mind if we seek their explanation or in other words proceed from the general to the less general rather than in the opposite direction. It may be that certain physico-chemical states are a part of that complex we call life but we must start with life and find them—we cannot find them in non-living matter first.

This attempt, so constantly repeated in all elementalistic schemes and as a part of the

[3] Guye, *loc. cit.*

analytic method to explain the higher by the lower, the complex by the simple is founded in a serious misconception. The assumption is that chemical systems are simpler than structural organic systems and then the further assumption is made, for instance, that the more complex can be explained, resolved into the less complex.

Schiller[4] discusses this whole question quite fully. He says, among other things,

> Naturalism is sooner or later doomed to failure. It leaves out the higher aspects of things and in the end these cannot be omitted. For the objects of the physical sciences forming the lower orders in the hierarchy of existence, though more extensive, are less significant. The atoms of the physicists may indeed be implied in the organization of conscious beings, but in a subordinate capacity: a living organism exhibits actions which cannot be formulated by the laws of physics alone; man is material, but he is also a great deal more, to wit, alive, physical, and moral. Again, all bodies gravitate, but the activities of living, to say nothing of rational, bodies cannot be explained by the action of gravitation alone. So chemical affinities are presupposed in biological actions, but yet life is something more than and beyond chemical affinity. Thus it is the same inherent law of

[4] F. C. S. Schiller: *Riddles of the Sphinx.*

the method which is displayed, not only the palpable inadequacy of explaining biological facts by chemical or mechanical facts, but also in that of explaining the rational or moral by mere biology.

The naturalistic method, therefore, in trying to explain the higher by the lower, constantly fails to include the whole of the higher, and is constantly driven to deny what it cannot explain, and to reduce the higher to the lower. But though at first it seems plausible to explain the higher and fuller by something which *seems* simpler because it is less significant, by dint of leaving out its surplus meaning, this process becomes more and more difficult the further it is carried, and if it were carried to its consistent conclusion, it would be seen to refute itself. It would end by explaining all things by that which is nothing in itself, and has meaning only in relation to the things it is supposed to explain. The further we carry our researches into the lower, the more it appears that it is not really simple, but only vaguer and more indefinite, and that the lack of differentiation indicates, not that we have got down to the fundamental principles of the complex, but that it arises from a confounding of all the distinctions which enable us to comprehend the thing.

To take only the one example of protoplasm, which is the starting-point of biology (itself one of the higher sciences). *For biology* protoplasm is ultimate: it can no longer be derived from any lower and "simpler" form of life. It can be defined only in terms of what it becomes or develops into. Yet this "simple" protoplasm performs all the functions which in its differentiated

developments fall to the share of the most various structures and the most various faculties. It sees and hears and smells and tastes and feels, thinks and wills and moves, it absorbs and excretes, it grows and reproduces itself, and all without any discoverable difference of structure.[5] What then have we gained by deriving differences we can see and partly understand from hypothetical differences which are invisible and incomprehensible? Is the mystery lessened by being relegated to the mythical region of the unknowable and imperceptible, and is it not in very deed an explanation *ignoti per ignotius?* . . . . things must be explained by their significance and purpose instead of by their 'causes,' by their ideals instead of by their potentialities . . . . instead of being simpler and more susceptible of explanation, the lower stages of the process are really the obscurer and more unintelligible, because they do not so clearly exhibit the drift of the process. . . . . The physical laws of nature are the earliest and lowest laws of the world-process, the most ingrained habits of things, the first attempts at the realization of its End, and so they are the very last to become intelligible. If we ever arrive at a teleological explanation of them, it will be only after we have *worked down* to them from the higher laws of the more complex phenomena. The basis, in other words, for a teleological interpretation of nature will not be found in sciences

[5] The author is hardly familiar with the recent work on the structure of protoplasm and of the cell. This, however, does not affect his position.

like physics and mechanics, but in sciences like psychology, sociology, and ethics.

As Lotka[6] very well observes in commenting on the relative simplicity of chemical systems as contrasted with the structurally complex organic systems: "The reason for the simplicity is to be found in ourselves. It is not a physical phenomenon of the thing observed, but a psychological phenomenon in the observer."

This whole argument may be reduced to the really simple though paradoxical statement that a whole is not equal to the sum of its parts. For example, if two cells are united to form a two-celled organism, or more familiarly if two men are united in a partnership the characteristics of the organism or the partnership can never be fully explained by adding together the characteristics of its two component parts. The organism or the partnership consists, it is true, of these two parts, but beyond that it consists of the relations existing between the parts and it is

[6] Alfred Lotka: *Elements of Physical Biology.*

just the phenomena of this relationship which escape inclusion in any analytic scheme that would explain it by tearing it apart and reducing it to its component parts.

Any attempt to explain the human organism which leaves the psyche out of consideration is bound to fail in completeness and, too, to go a step further, inasmuch as man is a social animal, any attempt to reach a full understanding of him that leaves out of account his social relations is also bound for failure. Explanations, to be complete, or to approach completeness, must at least be inclusive of all the qualities of the phenomena to be explained, must at least be of the magnitude, dimension, order of the phenomena under examination. An apple cannot be measured in terms of a brick nor can, in general, the organic and living be measured in terms of the inorganic and dead.

The conclusions from what has been presented in this chapter are as follows: that the simplicity or complexity of a certain order of phenomena is a judgment which does

not bear close examination; the simplicity resides in us rather than in the phenomena under scrutiny: the higher cannot be explained by the lower because the lower does not include the phenomena for which explanation is sought therefore any explanation must issue from an examination of phenomena of at least as high order as those for which the explanation is sought: a whole is greater than the sum of its parts.

CHAPTER III

Fundamental Concepts

> Living things preserve, or tend to preserve, an ideal form, while through them flows a steady stream of energy and matter which is ever changing, yet momentarily molded by life; organized in short.—*L. J. Henderson.*

> Mathematically speaking, organic form itself appears to us as a *function of time.*—*D. W. Thompson.*

As already indicated, in the last chapter, there are in science certain fundamental concepts such as space, time, matter, energy, life and mind which seem to defy analysis but which are basic in all scientific thought. It is not my intention to attempt a detailed philosophical discussion of these concepts but only to deal with them sufficiently for the purposes of the exposition herein attempted.

It is more or less obvious, for example, that anatomy deals essentially with spatial relations. The size and shape of organs

occupies the center of interest and too the relations—spatial—of these organs to the parts about them. These are all affairs of space and of bodies at rest. Anatomy is spatial and it is static and of course material for it deals with the spatial relations of matter at rest.

Physiology, the central idea of which is function, must introduce motion—energy—into this dead body of anatomy. Here we have matter in motion and wherever matter is in motion of course time must enter also, although as we shall see time may enter in a very elementary way whereas it is really of first significance. Physiology deals with the living body too in contradistinction to the dead body of anatomy and so life enters into the complex of fundamental concepts, though often, as physiology is generally taught, only by implication, no serious attention being given to its consideration as such. In fact it has taken some time to realize that vital processes could not be equated with the chemical changes that can be produced at will in the laboratory.

When we come to psychology and psychiatry we find in addition to all the concepts thus far considered the added concept of mind.

There are other concepts, also quite fundamental, that might be considered, for example, the concept of natural law, of truth and many others which will be discussed in the appropriate places. I desire only at this point to call attention especially to three, mind, energy and time, as being I believe of particular importance because less well understood and so more neglected in their applications than the rest.

TIME

Medicine has not failed to use the time factor as it enters many of its problems. In fact the most comprehensive theory in biology, the theory of evolution, which medicine has used in innumerable ways for many years, rests upon the importance of this very factor in attempting to account for the ordered sequence of living beings in the

history of the world. But to recognize a fact when it is brought to our attention or even to act in a way that implies its recognition is a very different thing from having it in the focus of our awareness and so having it always available for use.

My thesis is that time is a dimension of every event, not just of a select group, and that therefore it is quite impossible to understand any event without taking it into consideration. For example; if we wish to see John Smith and know where he lives we can locate his house with mathematical accuracy by the use of the three coördinates of space of the Euclidian geometry. If he lives on the north east corner of 5th Avenue and 56th Street in New York City his house could be located geometrically by drawing a line on the east side of 5th Avenue running north and south and another, at right angles, on the north side of 56th Street. The point of intersection would be John Smith's house. Now if he lives on the third floor a perpendicular erected at the point of intersection and

stopping at the third floor would locate the place *where* John Smith lived. But if we want to see him we will have to go there *when* he is there.

Space and time are both dimensions of every event and no event can be fully understood—measured—unless both are used. Inasmuch as this is not a static universe, and no object is at rest, but all objects are in motion in relation to all other objects an object can never be located in space by the space coördinates alone, the time coördinate must also be utilized. This is tantamount to saying that we must clearly realize that we can no longer expect to go on living *as if* we were in a three dimensional universe but that we must accept the fact that our universe, in all parts of it, is in motion, and therefore that it is four dimensional and that time is the fourth dimension, the fourth coördinate, *the temporal coördinate.*

A simple illustration will make this rather abstract proposition clear. We might have gone on indefinitely refining our description

of the appendix, describing its size and shape and its location in relation to all the parts about it, in short we could have gone on forever with our description in space of the appendix but we would never have understood the *meaning* of the appendix until we applied the temporal coördinate and studied its development in time, worked out a temporal series of the different stages in its phylogeny, in other words until we studied its comparative anatomy, its embryology, and its phylogeny.

This method of studying the appendix is precisely what has been done and what has resulted in our present understanding of its meaning. The method, however, has not been applied with a full conscious appreciation of its universal applicability and therefore has only been used to its fullest in cases where the time factor was more or less obviously important, as in this instance. In other words, while the method has been used it has only been used incidently as it were and without a full appreciation that it was a

method, or of its significance as a method. The use of the temporal coördinate should no longer be left to chance or employed implicity but should be appreciated as a method of universal applicability and then only will its possibilities by fully realized. The use of the time factor for measuring all events must be realized, not by implication, but fully, which means consciously. A psychic fact to be utilizable at maximum efficiency must be brought into the light of full conscious awareness. Only when we do become fully consciously aware of what we are doing is our method under that control which makes it of maximum value.

This introduction of the time coördinate into the field of medicine as one of the constant dimensions to take account of is illustrated in the known vulnerability of inferior or infantile types of organs, that is, of organs defective in development, as compared with the so-called normal or adult type of organ, and the relative malignancy of tumors of embryonal tissue characteristics. It would

seem that the organs or tissues in question have failed by not having come up to a standard that implies that they have acquired the maximum results of past experience as laid down in structure.

MIND AND BODY: ENERGY

Mind, as I have already intimated, is one of those ultimates that defy definition yet, even so, it is not altogether impossible to formulate what we mean by the term. We may, so to speak, resort to a somewhat circuitous device and find by so doing that "the longest way 'round is the shortest way home."

If instead of attempting the definition of mind *de novo* we undertake to describe or define the character of the experiences which we refer to as mental we shall find, I think, some very interesting things.

In the first place, mind, I think we shall be ready to admit, is a function of the organism but, in contrast to all things mental, if we inquire of any other function of the organism

we find ourselves at once in the realm of physiology. For example, if we ask What is the function of the heart? the stomach? the kidneys? the answer, without question, lies in the realm of physiology. If, however, we ask such a question as, What is the man doing? we, of necessity, must couch our reply in terms that are psychological.

What is the difference between these two situations? It is obvious. The former deals with partial reactions, the latter with total reactions. The answer to the question What is the function of the stomach? is digestion which is but a small part of the activity of the total organism and only indirectly, though of course importantly, related to many of its other functions. But if we undertake to answer the question What is the man doing? we reply in terms of the total organism by saying, for example, that he is walking down the street or running a foot race or going to the theatre or studying medicine or what not. The distinction has

been graphically compared by Mercier[1] to the differences in function between the engineer and the navigator of a steamship. Their functions, despite the fact that they are intimately related and interdependent and mutually necessary each to the other are nevertheless quite distinct and different in character. Their functions differ in the same way as do physiology and psychology; namely, the one deals in partial, the other in total reactions.

Certain further results flow from this way of looking at things. By the process of logical fate if we start from a certain assumption certain results follow of necessity.

If mind is the expression of a total reaction in distinction from a partial reaction then every living organism must be credited with mental, that is, total types of response. This is so, but it is no less difficult to think of the body as developing from a unicellular organism, as each one has either ontoge-

[1] Charles Mercier: *A Text-Book of Insanity*.

netically or phylogenetically or both, than it is to think of the mind as having similarly simple beginnings. What we know as mind in all its present infinite complexity is the culmination of a type of response of the living organism that is historically as old as the bodily types of response with which we are more familiar. Mental reactions, as we know them, have a historical development as old as are the bodily reactions and like them can only be adequately understood in the light of that historical background (temporal coördinate).

If then the psyche has a historical background equal in duration to that of the soma it follows again on the principle of logical fate that it must have its embryology, its comparative anatomy, and its paleontology and this is of course true. Genetic psychology deals with the developent of the child mind in particular but we also have those comparative studies that include in the study of the mind a comparison, not only with the child mind but with the mind of the savage

while psychoanalytic research is invading the psyche in its intrauterine fastness and identifying archaic processes and psychological fossils in the field of paleopsychology.[2]

If we consider the individual in this way, as possessed of psychic patterns of reaction that contain the precipitate of millions of years of experience as the body contains that experience laid down in structure, then we are inevitably led to consider body and mind as ways in which experience has been translated. The somatic way of translating experience is by structure; or as I prefer to put it by the structuralization of function. That means that circumstances (the environment) set certain tasks for the organism, that is, produce certain disturbances of equilibrium to which the organism responds in a specific way. If a response of a certain adequacy is necessary to insure survival of the organism, if it has, in other words, survival value it tends to become stereotyped to the extent that its various expres-

[2] S. E. Jelliffe: *Paleopsychology*.

sions tend always to flow along the same channels which channels by becoming permanent avenues of discharge, like the channel of a river, are laid down in the structure of the organism. In the region of the psyche a corresponding relation to structure, if it exists, escapes us and what we have is nascent function, as it were, which is still free from the confines of structuralized channels and therefore modifiable and capable of change of direction. In this region of the mind we speak figuratively of psychic structures and organs or more correctly in accordance with accepted usage of psychic constructs and also we speak of psychic content as analogous to structure and psychic process as analogous to function.

From this further elaboration it is evident that we are reducing both soma and psyche to a more ultimate concept, namely, energy. Is this sort of generalization warranted? I think so.

In the first place let us consider briefly

the warrant for reducing the soma to energy. The soma we ordinarily think of in terms of matter and to reduce it to energy is to reduce matter to energy. But this is just what is happening in modern physics. The atom used to be considered as the smallest particle of matter but now when it can be analyzed into its component electrons we find that all we know of these electrons is expressed in terms of energy. In other words, they *are* quantities of energy. Schiller[3] states the case very simply when he says, "All the sensible qualities of Matter are due to forces, gravitative, cohesive, repulsive, chemical, electrical, or to motions (like heat, sound, light, etc.), or 'motive forces.' Matter itself, therefore, is left as the unknown and unknowable substratum of Force. There is no reason why the term Matter should appear from one end of a scientific account of the world to the other. It is not required to explain the appearance of anything we can

[3] F. C. S. Schiller: *Riddles of the Sphinx.*

experience, and is merely a metaphysical fiction designed to provide forces with a vehicle."

This does not mean that the concept "matter" is of no value just because it is a fiction. Fictions are of immense utility, in fact we could not do without them. It is a question, largely at least, of the level at which they are used. It would be foolish to reduce the mountain to terms of energy if we had to climb it. The mountain as matter is, under those circumstances, a perfectly useful and practical construct for purposes of climbing but for the purposes of knowledge or philosophy it may be of no use.[4]

Now as to mind as energy. The physicist would say that mind cannot be equated with energy because it is not measurable. Nevertheless to think of mind in terms of energy has pragmatic and heuristic advantages because it enables us to take hold of mental phenomena, to visualize them and so get a

[4] H. Vaihinger: *The Philosophy of 'As If.'*

useful perspective of them and thus to see mental phenomena in a setting that allies them with natural phenomena in general and thus think about them in new ways that bring out relations that would otherwise escape us.

From this standpoint therefore the organism, to use the expression of Lotka[5] is a *life bearing energy system* which has, among others, time, energy and psychic dimensions and *which is undergoing irreversible changes.* Let us follow this line of thought a little further.

My suggestion is that the most practical way to deal with this situation is to regard mind and body as two aspects of the organism, like two faces of a crystal that may be considered separately or as related to the entire structure.

The meaning that immediately emerges from looking at mind and body as but two aspects of the organism is that *for every*

[5] Alfred Lotka: *Elements of Physical Biology.*

situation there is as well a psychic as a somatic aspect, or, as there is no controversy about the latter, that every situation, for our purpose, *every disease*, *has a psychic component*, and further that this component has a history as long and as important for its understanding as has the somatic component. It is only since the advent of the theory of evolution that the importance of the past for the understanding of the present has been appreciated. Heretofore, however, the importance of the past has only received a partial acknowledgment by somatic pathology. We are now beginning to learn that it has an equal importance for psychopathology.[6] This concept in its length, breadth and thickness, that is, in all that it implies, is really revolutionary and to my mind may easily be the most important thing to happen to medicine in many a day. It means no less than that for an adequate understanding

[6] See my *The Comparative Method in Psychiatry*. Jour. Nerv. and Ment. Dis., January, 1925.

of any present situation the entire past, which necessarily includes the past of the psyche, must be understood. The present does not stand alone, it emerges from the past.

It would hardly seem necessary to proceed further along these lines to appreciate that I am aiming at a conception of the organism that regards it fundamentally as a going concern, not as an organic formulation that has come to rest, and further that I think of energy, not as of two kinds, bodily and psychic, but as of one kind. Body is one aspect of energy, it is what I have called energy laid down in structure or *structuralized function*. Mind is another aspect of energy. Here the process of thinking is function, and the content of thought is structure. What we are really dealing with, therefore, is the *distribution of energy* as psychic or somatic *and its differentiation* in these two spheres of activity. By differentiation is meant its investiture of the several psychic and somatic

structures.[7] *The final pattern of the psyche, then, at whatever level we cross-sect it, is backgrounded by a specific pattern of somatic structure and energic investiture.*

The whole problem of chronic disease, it would seem, might be illuminated from this standpoint. Here we may easily be dealing with mechanisms that put too much load upon certain organs. A shifting of the objectives of the individual in time might redistribute the load so that it would be much more comfortably borne, or actually diminish it materially. Take, for example, the problem of cancer, which for so long has resisted solution. Malignant neoplasms can be thought of as examples of groups of

[7] I speak of psychic structures and organs just as I speak of somatic structures and organs. This use I believe fully warranted by modern theories of energy and of the structure of matter. I think, too, that to think of an idea or a feeling as an organ as only vaguely perhaps analogous to a muscle or a ganglion in having a function to perform, in being constructed, so to speak, for the special purpose of doing a particular thing, to think of the unconscious as a vast and complex organ of the mind, like the cerebrum perhaps, helps one to think of the organism as a whole and of the play of energy throughout its many structural parts.

cells which either have accumulated sufficient energy to start an independent organization of their own or have escaped the dominance of the parent organism because of its failing strength—senility or pre-senility.[8] Many illuminating analogies might be drawn along these lines, as for example, the analogy to anarchy in the social sphere, and the embryonal character of the malignant cells as comparable to the similar embryonal character of anarchistic groups resulting as they do from a breaking down (dedifferentiation) of the social structure. It is easily to be seen that the entire symptomatology of cancer does not refer only to the tumor mass but, as in the corresponding case of anarchy, resides also in the higher centers—evidences of loss of control, loss of dominance, the result of senility or pre-senility.

Let me use this type of illustration a little further to give an indication of how the consideration of the organism as an energy

[8] See C. M. Child: *Physiological Foundations of Behavior* New York, 1924. Henry Holt and Co.

system may be illuminating. As is known, malignancy is by no means necessarily a sign of senility. Anarchistic cell growths may arise during the period of youth and this is due, in accordance with the principles I have just suggested, not to failure of dominance but to an accession of energy by the group concerned, which is ordinarily expressed by saying that continuous irritation may be at the basis of a malignant neoplasm. In other words, energy has been added at the point of irritation until its sum total is sufficient to enable the cells at that point to overcome the dominance of the parent organism, and the natural tendency of the cells toward unrestrained growth and multiplication is realized.

Let us follow this suggestion a little way and see where it leads.

The first type of case I have in mind is represented by a case reported by Maeder.[9]

[9] A. Maeder: *Psychopathologie und allgemeine Pathologie.* Zeitschr. f. d. g. Neu. und Psychiat., April, 1923, ably abstracted by M. R. Barkas in the Jour. of Ment. Sci., July, 1924.

A young woman has a very ardent love affair, which, however, comes to naught. The engagement is broken off. Her heart is broken, she becomes depressed, loses her appetite, ceases her social activities, gives up her interests, becomes more and more self-centered, loses flesh, has insomnia, and develops pulmonary tuberculosis. Treatment addressed to the psychological situation, which restores her hope and brings back her interests, results in cure not only of the mental depression but of the tuberculosis. How are we to evaluate such a situation? My way of thinking of it, which seems to me decidedly helpful, is from the point of view of the organism as an energy system. This woman as an energy system had been in the habit of finding a very definite outlet for her energy in a given direction and an outlet which was adequate, not only sufficient in size so that the energy could get out in sufficient quantity but also it led in the right direction because it was socially acceptable and acceptable to her own ego ideals. Now

this outlet is cut off and the question is, What becomes of the energy? Obviously from the symptomatology the energy has ceased to flow in outside interests. The energy has apparently become occupied with matters that are closer than the outside world of reality, and as a psychiatrist I would have no hesitation in saying that if we knew the details of this individual's psychology we would learn that the energy was largely occupied in a very rich phantasy life. But another thing has happened which has not quite as obviously psychological implications. Especial stress has fallen on the respiratory system with the consequent development of pulmonary tuberculosis. Why the respiratory system should be especially stressed in such a situation is not clear. One might speculate at considerable length. The main point, however, is that a certain organ or system of organs appears to be particularly stressed under certain circumstances and to break down as the result of such stresses, the stress having originated

in deflecting energy from the direction in which it was flowing into satisfying interests back into the machinery. It is as if an automobile which had been running satisfactorily along the highway at 60 miles an hour were held fast by some obstacle so that it could not move forward at all but the engine was kept at the same speed. Under these circumstances I am quite sure that the machine would very soon develop difficulties, very much sooner in fact than if it had remained running on the highway. The energy, which under normal running conditions would be dissipated, drained off in all sorts of directions by radiation and otherwise, is now confined to the machine and will develop stresses, such as overheating, for example, which would not be developed under normal running conditions. I think the suggestions I make in this case make it possible to think about this particular patient and her pulmonary tuberculosis in a way which hitches up the whole symptomatology, mental and physical, into a coherent,

understandable whole, and shows very well the part the psychological component plays and equally well indicates that in this case pulmonary tuberculosis was by no means wholly a problem of infection.

I might cite another example illustrative in the same way of throwing too much stress upon some certain systems of organs or, as I have expressed it, of investing them with more energy than they are capable of handling. It is quite in accordance with orthodox conceptions that the business man who has led an active career until he has passed his sixth decade and who then retires not infrequently dies rather promptly. It seems to me that the energy concept lends itself to an interpretation of this result. As in the case of the tuberculous girl just cited, the avenues of outflow of his energy have been cut off, and the machine instead of running smoothly along the highway as has been its wont has stopped but the engine continues nevertheless to run at high speed. This means that the energy that otherwise

was drafted off into all sorts of channels of expression is now as it were turned back upon the machine itself. When we remember that this machine is sixty odd years old, that it is already in the presenile or arteriosclerotic stage of decreptitude, we can understand why its various parts, the several organs of the body, are incapable of withstanding this added load of energy and why the individual plays out earlier than he would if he had kept at his accustomed tasks.

This leads me to another principle which seems to me to be very significant for general medicine. Every organism follows a fairly well defined path of growth and development but we know that this path is not quite the same in every individual. If we were capable of plotting the assets and liabilities of each one in terms of energy distribution we would realize, what we have come to a beginning understanding of in our psychiatry, that the energy at certain points in the history of the development of the individual is blocked and at these points development

ceases. In other words in any given individual at any given time the various organs of the body and of the mind, for I think of ideas and emotions and tendencies as organs quite as I do of the physiological organs, are in various stages of development, some well advanced, advanced further than the age of the organism would indicate as usual, and some definitely retarded. In other words, the organism as a whole will present various regions that are normal, that is usual so far as their degree of development is concerned, and certain other regions that are unusual, either having a development in excess of that which one ordinarily finds or a development which is less than that which one ordinarily finds. These points of lesser development or of retardation represent liabilities in the pattern of the organism but they are not static liabilities. They nucleate forces which are endeavoring to find adequate expression and when for any reason the individual becomes sick and as a result of his illness the control which is exercised by the higher cen-

ters, that is, the better developed aspects of his personality, lose their hold upon these retarded components then these retarded components become activated, and inasmuch as their activity takes place at a considerably lower level than that at which the activity of the individual as a whole has been accustomed to function, they make for an aggravation of the symptoms of illness. In other words disease tends to mobilize all these primitive and negating trends which have not found a proper place in the development of the organism,[10] and thus are organized a group of factors which ally themselves with the disease. We are very well familiar with this picture in some of its cruder outlines. The patient who has had in the back of his head for years for some reason or other a definite fear of death but who has been able because of a relatively successful career to keep it in the back of his head is seized with a serious physical illness. As a result of this illness his fear of death is mobilized

[10] See Maeder, *loc. cit.*

and becomes a distinct ally of the disease, and under these circumstances we know how much more serious the prognosis becomes.

I could give many other examples, from other forms of disease, of the general principle illustrated by the above cases, which is this: *that any new problem of adjustment requires a redistribution of energy and when energy is redistributed in the body the stresses fall in different places, and that organic disease may be related to this redistribution of stress.* From this point of view our original question, What is the man doing? develops much greater significance. We have answered this question in psychological terms. If we could answer it in terms of distribution of energy, or, in other words, in terms of the stress placed upon the various organs, we would have an energy pattern of the individual which would indicate the points at which he was being over-stressed and at which, therefore, he might break.

It is altogether too much to expect that we can answer this question in these terms at the

present time, but the only aspect of the individual that we can interrogate is the psychological and that is why in a discussion of the psychological components of disease this question of organic stress must be considered.

Parenthetically it may be remarked that this way of viewing malignant disease is not negatived by an assumed microörganic etiology. An etiologic organism in this general energic scheme would be merely an agency by means of which energy was added at a particular point.

The advantages of this energic concept are well illustrated by this example. By considering somatic structure and psychic function as the two extremes of energic possibility, function laid down in structure or function nascent, we can hitch all phenomena at all levels into a coherent picture. Irritation, parasitic, chemical, mechanical or of whatever sort is a means of adding energy at the somatic level, while from the other end of the situation the same sort of dynamic im-

balance can be produced by the removal of control from above—the psychic level.

The important conclusions of this chapter are: the importance of the time coördinate to medicine: physiological reactions are partial reactions: mental reactions are total reactions, that is, reactions of the organism as a whole: the psyche is as old as the soma and like the soma must have its embryology, comparative anatomy and paleontology; namely, genetic psychology, comparative psychology, and paleopsychology: the somatic way of translating experience is by structure or the body represents function that has become structuralized. In the psyche we are dealing with nascent function: soma and psyche may be reduced, at least for pragmatic and heuristic purposes, to a more ultimate concept; namely, energy: fictions may have practical utility if their use is confined to their appropriate level: the organism is a life bearing energy system, not a closed energy system but an open energy system, and in its growth and develop-

ment it is undergoing irreversible change: for every situation there is as well a psychic as a somatic aspect: every disease has a psychic component. The pattern of the organism is a pattern of somatic structure and of energic investiture: the concept of energic investiture is important for the comprehension of disease: problems of adjustment require redistributions of energy and the new stresses developed by this redistribution may cause disease: states of dynamic imbalance however produced either by adding energy or by subtracting it impair the ability to adjust adequately.

CHAPTER IV

Man's Place in Nature

It is not so much the organism or the species that evolves, but the entire system, species and environment. The two are inseparable.—*A. Lotka.*

The fitness of the environment is one part of a reciprocal relationship of which the fitness of the organism is the other.

A fit organism inhabits a fit environment.—*L. J. Henderson.*

Man's place in nature might be considered either in the verticle or the horizontal dimension. In the former case the problem is one for biology and has to do with his biological affiliations to the various forms of life, especially those that immediately preceded him on the upward path, in particular the anthropoid apes. This problem does not hold any important interest for us in our present quest. In the latter case the

problem is one of his relations to the inorganic, organic, and social factors in his environment. In particular it is a question of his relations to his environment in its broadest aspect.

In the last chapter we considered the human organism as an energy system. But it has been considered in the past, and too in the present, by implication, at least, as a closed system largely, I believe, because of man's inherent desire to think of himself as a specially favored being in some way set apart from and superior to the rest of nature. The human organism is an energy system but it is an open energy system constantly, continuously, and unremittingly receiving energy from without, and transforming and transmitting energy to other systems. Energy constantly streams through the organism and in the streaming it constitutes the energy of the living organism. In fact the whole business of life consists in the capture, transformation and transmission of energy, whether that energy be for the time

being bound up in heat waves or in food or whether it be potential for use in the future or kinetic for use in the present. It becomes, therefore, of the utmost importance in our thinking about man to realize that he is this sort of an open life bearing energy system in constant energic relations with the various aspects of his environment, in fact that he is not at all sharply differentiated from that environment but is in a very real sense, a part of it. This concept is perfectly easy to visualize so soon as we do away with our preconceived prejudices for material concepts and think of him only in terms of energy. When we do this we can easily see him as in a constant state of more or less unstable equilibrium in relation to the forces about him and therefore with boundaries that are ever changing as between what he is prone to think of as himself and his environment. "The life contest, then, is primarily a competition for available energy."[1]

If we start from this synthetic standpoint

[1] Lotka, *loc. cit.*

of the organism as an open life bearing energy system rather than the analytic, which is the one generally in use by medicine, we come to an entirely different concept of the human individual, and it is my contention that one of the great values of this point of view is just because of this fact. Medicine has now been proceeding for some considerable time in the direction of increasing specialization, which means a further and further division of the individual into territories for special study and investigation. Whether this method has exhausted itself, whether it has reached its best results, and whether it may not be on the verge of becoming sterile for further advance, I do not know; but I do feel that the time is here for a new point of view, a new direction of medical thought, which will be rejuvenating in its effects, particularly in the consideration of the great silent areas of medical research. I am convinced that many problems that have long resisted the analytic method will show signs of capitulating in face of the synthetic.

The first thing this synthetic approach does for us is to recombine the organism, which had been split by the specialties, into a coherent, coördinated, integrated whole. In such a whole nothing can be trivial, nothing insignificant. When it is realized that most of the bodily organs represent the structuralization of millions of years of experience the respect for them and what they stand for in the organism as a whole will increase.

It is easy to understand how a considerable disturbance of one of the vital organs will seriously upset the whole individual but the ramifications of the functions of the organs of lesser importance are usually not seriously considered, as witness the nonchalance with which they are removed. An analogy may serve to bring this point home and to illustrate that the environment is a part of the energy system of the organism in very fact so that those aspects of it that are in close and important relations to it can only be disturbed at the peril of the organism and that

peril is because of the close energic interplay of forces and for no other reason. What would happen, for example, in this automobile driving age, if some social surgeon should cut rubber out of the social organism? We can, perhaps, form some idea of the amount of personal and social readjustment that would take place. Let us consider briefly somewhat more important or less well known organs. Take nitrogen. What would happen if nitrogen were removed? In the first place, war, as at present understood, would be impossible because all the high explosives depend, for their power, upon nitrogen. Just this alone gives a faint idea of the revolution in the social organism that would be necessary if nitrogen were removed, to say nothing of ramifications in the field of medicine and surgery and in the industries and its supreme importance in plant growth. When we come to a social organ like the coal industry the average person can only be appalled at the consequences of a failure of the coal supply, and yet

the average person probably has little conception of coal other than as a source of heat. The enormous number of substances that are produced from coal, particularly the coal tar products, the oils, dyes, drugs, chemicals, find their way in every direction throughout the whole social fabric, and no man would be so rash as to even attempt the prediction of what would happen as a result of a failure of the source of supply. Cotton-seed is a similar, but less known, instance. Few realize the multiplicity of products, clothing, rope, writing paper, powder, varnishes, artificial silk, fuel, fertilizer, feed, oil, that comes from this source. The ramifications are of enormous complexity, but because unknown the social surgeon might undertake their removal with unpredictable and not understandable consequences. We have some historical evidence to indicate what might be the result of a serious attempt to destroy social institutions founded in ages of tradition, such as the Church, the Law. The result has been

chaos, a breaking down and disintegration (dedifferentiation) of the social structure before a new structure can be built up (rejuvenation).

These illustrations give roughly the way in which a synthetic approach to the individual must, of necessity, lead us to think of him and of the relations his various parts—organs and functions—bear to the whole organism and the relation that the organism bears to the multitude of sources of energy that surround and variously influence it.

This influence of the environment is not incidental or accidental, it is not casual in any sense but it is of the utmost importance as I will proceed to show. The most illuminating contribution to this problem has been that of Child.[2] He sets out to discover what constitutes a living or organic indi-

[2] C. M. Child: *The Basis of Physiological Individuality in Organisms*, Science, April 14, 1916. *Individuality in Organisms*, University of Chicago Science Series. *Senescence and Rejuvenescence*, University of Chicago Press. *Physiological Foundations of Behavior*, New York, Henry Holt & Co., 1924. *The Origin and Development of the Nervous System*, Chicago, 1921.

vidual—what is at the basis of its unity and the orderliness of its behavior. The structure of an individual is purely a matter of anatomy, it is the orderly integration of the structural elements which remains to be accounted for. In other words it is not the static but the dynamic individual that needs defining. After a review of the several theories he discards them all, even the more recent physico-chemical theories which see in chemical transportation the fundamental element in physiological correlation. While chemical correlation is without doubt a factor it is only possible in an already existing individual in which some sort of order already exists. Any adequate theory of the individual must therefore be dynamic and deal with processes rather than with structures. Contrary to the assumption of biologists who believed that physiological individuality was inherent in protoplasm and dependent upon a self-determined organization he sees physiological individuality as a function of the relation between protoplasm and its environment.

The nature of the integrating factor of relationship he arrives at by assuming first a bit of undifferentiated protoplasm. Now let a difference at some point in the environment act as a stimulus at a given point at the surface of this protoplasm. The immediate result is an increase in activity at this point, which dynamic effect is not limited to the point of contact but tends to spread in ever widening waves of decreased energy much like the waves which result when a stone is thrown into a quiet pond.

As the wave of activity spreads it successively acts as stimulus so that the wave represents the spread of the increased activity originally set in operation by the stimulus from the environment. As it spreads, too, there is a constant decrement in its effectiveness, so that a dynamic gradient is established, the point of greatest intensity or highest rate of activity being the point of incidence of the original stimulus. A passing stimulus produces only a passing gradient, while a long continued, or often repeated, or

very strong stimulus, or all combined, tends in proportion to these several qualities, to establish permanent changes in the protoplasm along the path of the increased activity. The dynamic gradient tends to become persistent and consists fundamentally in a change in reactivity, irritability of the protoplasm. Finally this dynamic, or irritability or metabolic gradient, as it really is because here tissue changes go on most rapidly, becomes the starting point of a permanent quantitative order in the protoplasm or a physiological axis of the simplest form of individual. This first order to arise is the chief, polar, or major axis, while similar orders developed later determine minor axes and on the basis of these is established the symmetry of the individual.

This matter of symmetry has been largely discussed in the past. Spencer in his Principles of Biology has devoted a great deal of space to it and concluded that it was a function of the relation of the animal or plant to its environment. For example, an

animal moving through water will, by that very fact, expose its forward end to the operation of forces quite different from those to which the other end is exposed and so it tends to become different. Thus begins a polar differentiation which results, other things remaining equal, in radial symmetry. Now if one surface is always uppermost and the other lowermost a further differentiation will ensue resulting in a bilateral symmetry. This is precisely the state of affairs and the result which Child sees when he points out the results of a stimulus applied to an undifferentiated bit of protoplasm. There results what he calls a dynamic gradient which gradient if maintained ultimately becomes one of the axes of the individual, all of which are arranged in various degrees of subordination to the major axis. It is such an arrangement about a major axis which is the fundamental fact of the physiological individual, according to Child, a conclusion reminiscent of Spencer's, who considered the individual as "any center or

axis that is independently carrying on that continuous adjustment of inner to outer relations which constitutes life." If the same character of stimulus is repeatedly applied to the same portion of the animal; if, for example, the animal keeps thrusting the same part of its body forward into the environment, then the protoplasm along the lines of the transmission of energy from the stimulus will tend to organize into a chemico-physical equilibrium with the rate of energy change. In other words substances will tend to accumulate at the different levels of the gradient which are in dynamic equilibrium with the energy transmission at those levels—the gradient becomes organized.

Not only is the principle of the organization of the gradient visible in the processes briefly outlined in this illustration, but another principle of as great importance comes out with equal clearness, namely that structure is organized function, or, as Bergson would perhaps put it, structure is the organization of the past, or, organization is the

structuralization of function or of the past, From this point of view the nervous system as a structuralized dynamic gradient or as an organized system of relations between the parts of the organism, is given a new meaning.

Now of course, as Child has very well shown in the simpler organisms, an individual has many gradients. Among the simpler individuals these are expressed in the various axes of symmetry. Among the higher animals each organ would have a dominant gradient of its own and probably many subordinate ones, while the total interplay of forces in the individual can be visualized as playing along the axes of these multitudinous gradients, now reinforcing, now inhibiting, according as their energy rate is mutually assimilable or not, all of this great number of gradients held in an orderly organization because of mutual relations of dominance and dependence and all in the last analysis under the final domination of the gradient of highest metabolic rate, which in turn is dominated by its region of highest metabolic rate—the head end.

From this presentation it is easy to see how erroneous is the ordinary way of thinking of the dominance of the head end of the body. It is quite usual to conceive of the psyche, for example, as if it were a concrete entity which made its entrance upon the stage at some particular point in evolution—the only question is just when? Many people say than an animal cannot reason, has no soul (psyche), or even that children have no souls or are only little animals, while in the Orient, as is well known, woman is supposed to be without a soul. Aside from these rather crude ideas, however, there seems to be a wide feeling that evolution has taken place, so to speak, by a series of superpositions and that finally a head and then a psyche were added (evolved). From my presentation thus far it will be seen how far this is from the truth. There never was an organism, no matter how simple, how far down the line of evolution, but had a head end. The organism did not first develop as a group of organs and *then* develop a centralized control and coördina-

tion of those organs, but the development of the centralized control and coördination went along *with* the development of the organs. A moment's consideration will serve to convince one that this must have been so, inasmuch as the function of the various organs is in large part to serve the organism as a whole. No such service could be rendered without organization, and centralized authority is the basis of organization. The history of the head end, the head, the psyche, then reaches as far back as the history of life itself, in fact is coterminous with that of life. All the forces which have been operating to produce the developed organism have also been operative in producing the developed head control.

From this presentation it is seen that the integrating factor is not something mysterious that resides in the organism but as Child very well says, "We must seek for the integrating factor in the relation between living protoplasm and its environment." This integrating factor he traces to the

stimulus and the changes following its incidence. The nervous system is "the final expression of relation which is the foundation and starting point of organic individuation."

The human organism is not a closed system and by a parity of reasoning neither are psyche or soma closed systems as relating to each other. In my paper on Individuality and Introversion[3] I maintained the thesis that *the usual distinction between individual and environment is largely artificial, that the concept "individual" as implying this distinction has had a distinct history, an evolution, and that the distinction which does arise in this way is broken down by introversion as is particularly well shown in the introversion type of psychosis, dementia precox. The individual and the environment are not mutually exclusive. They are the two elements of a dynamic relation, of a constant interplay of forces, in which their relative values are in a constant state of flux.*

Child's theory assumes that, as a result of the action of the environment upon a specific

[3] *Essays in Psychopathology.*

protoplasm, there is set up, within this protoplasm, a dynamic, metabolic, or physiological gradient or axis. From this chief, polar, or major axis minor axes are established, *i.e.*, symmetry. Remaining within the control of this dynamic gradient is all that constitutes the individual. Individual and environment are thus easily seen to be only terms depending, at any particular moment, upon the relative strength of the forces concerned.

This general statement, however, gives little idea of the multiple ways in which these two zones of energy activity, individual and environment, interpenetrate. I will call attention here to Henderson's book on the fitness of the environment.[4] In this book Henderson discusses the properties of water, carbon dioxide, the ocean, and the three chemical elements, carbon, hydrogen, and oxygen. As an example of the nature of this discussion I will give the list of properties of water considered. They are: *a*, specific

[4] L. H. Henderson: *The Fitness of the Environment*. The Macmillan Co., New York, 1913.

heat; *b*, freezing point; *c*, latent heat of fusion; *d*, latent heat of vaporization; *e*, vapor tension; *f*, thermal conductivity; *g*, expansion before freezing; *h*, expansion in freezing; *i*, solvent power; *j*, dielectric constant; *k*, ionizing power; *l*, surface tension. He ends his chapter on water with the statement that "the following properties appear to be extraordinarily, often uniquely, suited to a mechanism which must be complex, durable, and dependent upon a constant metabolism: heat capacity, heat conductivity, expansion on cooling near the freezing point, density of ice, heat of fusion, heat of vaporization, vapor tension, freezing point, solvent power, dielectric constant and ionizing power, and surface tension." He concludes the chapter thus: "In truth Darwinian fitness is a perfectly reciprocal relationship. In the world of modern science a fit organism inhabits a fit environment." In fact his conclusion amounts to this: That all of the properties of matter investigated, for all practical purposes, are of

maximum significance for life. His final conclusions are these:

I. The fitness of the environment is one part of a reciprocal relationship of which the fitness of the organism is the other. This relationship is completely and perfectly reciprocal; the one fitness is not less important than the other, nor less invariable a constituent of a particular case of biological fitness; it is not less frequently evident in the characteristics of water, carbonic acid, and the compounds of carbon, hydrogen, and oxygen than is fitness from adaptation in the characteristics of the organism.

II. The fitness of the environment results from characteristics which constitute a series of maxima—unique or nearly unique properties of water, carbonic acid, the compounds of carbon, hydrogen, and oxygen and the ocean—so numerous, so varied, so nearly complete among all things which are concerned in the problem that together they form certainly the greatest possible fitness. No other environment consisting of primary constituents made up of other known elements, or lacking water and carbonic acid, could possess a like number of fit characteristics or such highly fit characteristics, or in any manner such great fitness to promote complexity, durability, and active metabolism in the organic mechanism which we call life.

It must not be forgotten that the possibility of such conclusions depends upon the universal character of physics and chemistry. Out of the properties of universal matter and the characteristics of universal

energy has arisen mechanism, as the expression of physico-chemical activity and the instrument of physico-chemical performance. Given matter, energy, and the resulting necessity that life shall be a mechanism, the conclusion follows that the atmosphere of solid bodies does actually provide the best of all environments for life.

Henderson's way of putting it perhaps best formulates this whole situation; namely, "*A fit organism inhabits a fit environment.*"

A very practically important aspect of man's environment consists of those elements that are of immediate necessity for his very existence such as his food, and more indirectly, the various domesticated animals that are useful to him in various ways not only as food, but for work or for supplying some needful product such as leather. We have thus to consider various networks or chains of interrelated species as related to man, such as cattle, grass, clover, corn, leather, fertilizer. As food we have the interspecies relations providing primary, secondary and tertiary food thus: the zostera (eelgrass) of the ocean provides food, not only for

certain useless animals considered from this point of view, but to numbers of useful animals that constitute part of the chain that leads to man, namely: starfish, gastropods and crustaceans which in turn are eaten by fish such as the cod and it in turn is eaten by man. The perfectly stupendous loss of foodstuff on the way from the eelgrass to man is evident as is also the complicated predatory interrelations of these various forms of life among themselves, all of which suggests that a more intensive development of aquiculture will be one of the phenomena of a gradual waning of existing sources of food. Shakespeare rather gruesomely expresses these interrelations by saying: "We fat all creatures else to fat us, and we fat ourselves for maggots."

The relations which man bears to the various animals he surrounds himself with and which he cultivates for food, work, companionship, are an example of symbiosis on a large scale which phenomenon is dependent upon a *quid pro quo* in energy exchange.

From the point of view developed in regard to food chains Lotka[5] discusses other aspects of man's environment as cycles in the transference of matter through different structures to and from man. Thus he discusses the water cycle, the organic carbon cycle, the nitrogen cycle, the phosphorus cycle, all in a highly illuminating way to bring out the various aspects of interdependence. "The life contest, then, is primarily a competition for available energy."

In order that the extreme complexity of the relations of man to his environment may be grasped even very inadequately the following illustration would seem to be helpful.[6]

> Take a high-grade shoe with a patent leather vamp and a dull leather top. The vamp is made of Russian horse-hide, tanned in this country with a bichromate of potash formerly obtained from Germany. The top, in all probability, is made from the skin of a goat raised in

[5] *Loc. cit.*

[6] From the New York Times, February 6, 1921: cited by W. N. Polakov: *Man and His Affairs.* Baltimore, The Williams & Wilkins Co., 1925.

South America, tanned in Philadelphia with gambier brought from the East Indies. Wool oil from Michigan makes it soft and pliable. The brilliance of the patent leather is obtained by polishing it with a composition containing lamp-black and turpentine from North Carolina, linseed oil from Ohio, damer from New Zealand, conchone and asphalt from South America, wood naphtha from Michigan, benzine from Pennsylvania, amber from the Baltic Sea, sandarac from Africa, mastic from the island of Scio, Greece, flemi from Asia and Cuban lac.

The lacing hooks and eyelets are made in Connecticut, the material in them consisting of alloys of zinc from the mines of Joplin, Mo., and copper from the Lake Superior district. Agatine, an ebony-like substance containing eight distinct ingredients gathered in Asia, South America and the United States, is used to coat them. The Australian kangaroo furnishes the leather for the tongue, the lining of which is felt made in New York State from the wool of sheep grown in Ohio. This felt is glued to the back of the tongue with gum arabic from the Near East.

The outer sole is obtained from the back of a Texas steer, tanned in Kentucky with bark from Tennessee, while the inner sole is made from the home-tanned hides of California cattle. The lifts of the heel are made from South American leather, and the dextrine which holds them together comes from Illinois cornfields. Before leaving South America the leather is partially preserved with chenang. The sole of heavy oak is stitched to a welt cut from Texas leather and made into

welting in Pennsylvania. The welt is stitched to the insole and upper with linen thread made from flax grown in Belgium and spun in Scotland. This thread is lubricated and strengthened with wax made from resin and tar extracted from the pine trees of North and South Carolina. . . . .

Portugal supplies the cork filler which keeps the moisture out of the shoe, the cork being mixed with a solution of pitch and tar from the Carolinas. The base of the leather box toe is made from Texas hides, hardened by shellac which, in the crude state, comes from Siam. The counter originally comes from the Argentine. Over the box toe is a protector made of Georgia cotton and coated with a composition of Para rubber. The felt heel pads are produced from the same sources as the lining in the tongue. The twill used in lining the shoe is made of Texas cotton, woven in Massachusetts mills and stiffened in Philadelphia with a paste produced from Kansas wheat flour.

Thread spun from Sea Island cotton supplies the top stitching, while the silk thread used in stitching comes from Japanese raw silk spun in Connecticut. The silk label also originates in Japan, but is woven in New Jersey. The shoe lace is made of native cotton dyed with logwood from Yucatan or with aniline colors made in Germany and this country. The lining and upper of the shoe are pasted together with a cement made of a Brazilian rubber composition. California produces the gold used for stamping the top facing, after it is beaten into thin sheets in New York State. The marking machine ink is made from Indian cochineal and oils obtained from Oklahoma.

The bright polish seen on the sole of a new shoe is due to a coat of bayberry tallow, which is produced from the fruit of the Indian bayberry tree mixed with native beeswax and turpentine. The tops are cleaned with gum tragacanth from Persia. Last, but not least, the nails used to fasten the heel and shoe together are made from Swedish iron ore, and a special steel manufactured in Pittsburg holds the top layer to the heel.

We get some idea from such illustrations of the enormous complexity of man's relations to his environment, inorganic, organic, and social and it is much easier to visualize these relations when both he and the various components of his environment are thought of in terms of energy—as energy systems, of various degrees of complexity.

Arguing in the reverse order we can see plainly that man produces all sorts of changes in the environment. These changes are implied in the illustrations given although they were used to show the effect of the environment on man. No naturalist, for example, could think of writing the natural history of wheat, its various habitats, its varieties, its geographical distribution and

the extent of that distribution, the changes wrought by cultivation, without taking man into account as the most important and potent factor in all these various matters. Man and his environment occupy positions that, from the point of view of the exchange of energy, are reciprocal.

The conclusions reached in this chapter are: that man's place in nature has to be considered in its horizontal as well as in its vertical direction: that man and his environment are not mutually exclusive systems but that what takes place in one is reflected and translated into the other, in fact the symmetry of the organism is a reaction to the environment; the environment is the integrating factor of the organism: man's relation to his organic environment may be regarded as an example of symbiosis on a large scale. Of course examples of parasitism are numerous, particularly important are the pathogenic microörganisms.

CHAPTER V

Action and Reaction

A "law" is simply the summation of constant relations when the chance variations and the apparent irregularities in detail are disregarded. *A "law" is therefore a summational fiction.—H. Vaihinger: The Philosophy of "As If."*

What we do when we investigate something "scientifically" is to observe space-time coincidences in a four-dimensional manifold.—*James Johnstone: The Mechanism of Life.*

What is the picture of the human organism we have developed thus far? It is the picture of a complex four-dimensional manifold of energy manifestations which, while more or less concentrated and defined within what appear to be fairly distinct boundaries are discovered upon study to be much less distinctly defined than appearances would indicate. In fact, it would appear that there are no distinct boundaries and if the temporal

coördinate is taken into consideration it appears that the relation between what is roughly called organism and environment is still less distinct, that in fact they are closely related aspects of the same fundamental energy as shown with especial clearness in the fact that the environmental forces are factors of integration of the organism, particularly of the development of organismic pattern. As Child[1] says: "The organism represents an order and unity in protoplasm which is related at every point to the external world. The development and evolution of organismic integration are essentially the evolution of mechanisms and methods of response and adjustment to environmental conditions." Man and his environment are not two separate entities or closed systems unrelated or only indirectly related to each other: the development and evolution of man as a life bearing, open energy system must necessarily include all

[1] C. M. Child: *The Origin and Development of the Nervous System.* University of Chicago Press, 1921.

related systems, inorganic, organic, and social: for man, in a very literal and real sense, is a part of Nature and his development whether physiological, sociological, or economic is but a part of the great process of nature:[2] so that it is not the organism alone or the species that evolves but the entire system: "a fit organism inhabits a fit environment."

From one point of view this may seem like deliberately wiping out all the distinctions and differentiations that have been built up as a result of evolution. This is not so. It is a new formulation based upon having pushed the frontier of knowledge beyond the old imposed material limitations. From the old standpoint body and mind were forever doomed to stand apart and unrelated but by pushing beyond the concepts that imposed these limitations, by bringing both together under the common concept of energy we get an entirely new point of view, open an entirely new way of

[2] See Lotka: *loc. cit.*

approach to age old problems and by so doing are bound to come upon things that the old way could never have led to. It is the history of science that new instruments or new methods always cause a rapid advance in knowledge until their resources have been exhausted when the curve of advance flattens out until again a new instrument or a new method causes it again to rise.

In such ways are natural laws disclosed, which enable man to handle the immense amount of factual material by a scheme of appropriate grouping. Law leads to an amazing simplification without which man would soon reach the limits of his capacity to assimilate new matter. Before the law of gravity was formulated by Newton the fall of a drop of rain, the flow of a river, the tides of the ocean, the revolution of the earth about the sun were all concrete, isolated phenomena. The law of gravity unites them in a common concept and thus enables the mind to deal with them all together, as one, instead of as separate and distinct events.

Law is nothing more than the observed regularity of natural events. Man does not make law, not even statute law,[3] he but discovers it and formulates it. Law itself may be a fiction[4] but it is a needed and useful one for it assists us in finding our way among natural events in relating our activities to phenomena in at least a sufficiently effective way to enable us to survive. As Bergson says,[5] "Our perceptions give us the plan of our eventual action on things" and so laws, by helping our perceptions enable us the better to act.

One of the natural laws which seem to be of very great importance in considering the human organism, especially from the standpoint of health and disease, and to which attention is naturally attracted by this method which reduces the whole problem of the organism to one of energy transfer is

[3] J. C. Carter: *Law: Its Origin, Growth and Function.* New York, 1907, G. P. Putnam's Sons.

[4] H. Vaihinger: *The Philosophy of 'As If.'*

[5] H. Bergson: *Creative Evolution.* New York, 1911, Henry Holt & Co.

Newton's third law of motion; namely, as follows: To every action there is always opposed an equal reaction: or the mutual actions of two bodies upon each other are always equal, and directed to contrary parts.[6] Or to put it in the simple form in which it is usually stated: Action and reaction are equal and in opposite directions.

If we have been right in reducing everything to terms of energy then this principle of action and reaction must be basic in all phenomena of life. The physicist and even the biologist are willing to acknowledge its

[6] In seeking for the correct formulation of this law of Newton's I found it in Osborn's Origin and Evolution of Life and very interestingly I found in a footnote the following: "I am indebted to my colleague M. I. Pupin for valuable suggestions in formulating the physical aspect of the principles of action and reaction. He interprets Newton's third law of motion as the foundation not only of modern dynamics in the Newtonian sense but in the most general sense, *including biological phenomena*" (italics not in original). Osborn says in the concluding pages of his book: "It may be said that the bulk of experimental work hitherto has been in the domain of action and reaction—here lie all the simple energy processes of growth, of waste and repair, of use and disease, of circulatory, muscular, digestive and nervous action."

fundamental importance but when it comes to the sphere of the mind all seem pretty well agreed that here is a region of indetermination to which the exact concepts of energy exchange cannot be applied despite the fact that they must know that it has only been in periods when such exact concepts governed, when determinism governed the minds of investigators, that scientific advance has gone forward rapidly. Once admit indetermination into the scheme of things and all order disappears and the incentive to look for explanations vanishes.

I may as well acknowledge, therefore, although I know it to be contrary to the prevailing thought of the time, that I look upon psychic manifestations as the result of energy exchanges and that I look upon the concept of society as an organism as much more than a simple analogy. I cannot split nature up into unrelated parts and whether I am right or not it does seem obvious that to consider the psyche as energy and society as a huge organism has, as I

have already said, distinct pragmatic and heuristic advantages. At any rate, as we shall see, the energic concept is of prime importance when it comes to the consideration of the nature of disease.

I must say, in passing, that I cannot escape the conviction that to travel the path all the way through the inorganic and then through the organic up to the higher mammals before forsaking the path of determinism smacks of either the existence of a profound and distorting prejudice or of being based upon a sad lack of information about the phenomena of the mind. I have the fortune to be the director of a hospital for mental diseases. It occasionally happens that a patient will succeed in securing an interview with some citizen of influence who is a man both of broad experience and intelligence. Occasionally such a man after a few minutes talk with such a patient, having discovered nothing wrong with him, from his point of view, will believe that he is perfectly all right and may even consider it outrageous that

the hospital should undertake to curtail his liberties or interpose objections to his discharge. Such a man would not think for a minute of disagreeing with the doctor who explained to him that his various examinations disclosed some subtle disturbance of metabolism or of the functions of his spleen or pancreas but he does not hesitate to express an opinion when the mind is involved off hand and without even making inquiry. The philosophers and biologists who talk about indetermination in the mental sphere are in much the same position as the intelligent gentleman just described. They have a particular blind spot even though they may think they see clearly. If such a man, in the one instance, could see the voluminous record of the patient in the hospital which in detail described years of all sorts of maladjustments, or in the other case if he could know the experiences of the psychiatrists and psychoanalysts with their innumerable examples of determination in just exactly those instances where it seemed

least likely to be demonstrable, he might perhaps change his opinions. The degree to which the average person's behavior can be reduced to more or less stereotyped patterns of response would be amazing to the uninitiated.

To revert to the principle of action and reaction. This principle has been variously referred to. It has been expressed in what is known as the theorem of Le Chatelier.[7] This theorem is that "a system tends to change so as to minimize an external disturbance." The boughs of a tree bend to the wind in proportion to its strength, when the wind is strong they bend far, when the wind slackens the boughs straighten up: in firing a cannon there is a recoil: if an electric current is passed through a solution a counter current is generated which tends to reduce the electrical stress: in the structure of bone the arrangement of the bony trabeculae follows the theoretical pattern of a stress-

[7] W. D. Bancroft: *A Universal Law.*

diagram,[8] the ossification taking place along the lines that take up, absorb, the stresses: pieces of metal habitually stressed in certain directions tend to so rearrange their parts that they offer greater resistance, the particles which lie obliquely to the lines of tension and pressure are displaced while those that are parallel or perpendicular to it remain in place,[9] for example, a piece of tow can support but little weight but when carded and all its fibres arranged parallel to one another, it makes a strong cord. It is plain that the principle here is this—force, energy, operating in any direction, has to overcome resistance, in proportion to the strength of the force, and that the push and the resistance are in opposite directions and tend toward equilibrium.

This principle could be extensively illustrated throughout the various realms of nature, inorganic, organic, psychic, and social. Such an illustration is that already given of

[8] D. W. Thompson: *On Growth and Form.*
[9] D. W. Thompson: *On Growth and Form.*

the dynamic gradient as described by Child. The illustration there given was a stimulus applied to a bit of undifferentiated protoplasm. Such a stimulus produced an area of increased activity at the point of application which spread in waves of decreasing energy along the lines of least resistance. Such a dynamic gradient tends to become permanent in proportion to the frequency and strength of the stimulus and finally to be laid down in structure like the trabeculae in the shaft of a bone Such a gradient then becomes a permanent part of the structure and by virtue of its presence tends still further to multiply the differences with which the organism responds to incident forces. Complexity makes for increasing complexity on the principle of what Spencer called[10] the "multiplication of effects."

This principle set forth in Newton's third law and in Le Chatelier's theorem has been still further amplified and formulated by Frédéric in his canon of physiology in terms

[10] H. Spencer: *First Principles.*

which are much more significant for living beings and in particular for the problem we are especially interested in; namely, the problem of disease. It runs as follows:[11] "A living being is adjusted in such manner that each perturbing influence provokes to activity a compensating apparatus which brings about its neutralization and the repair of the damage." Animals in a cold climate develop thick suits of fur to prevent the radiation of heat: desert plants, when the supply of water is scant, develop a considerable growth of hairs which impede the circulation of the air and thus lessen the rate of evaporation: the submerged leaves of aquatic plants do not develop the supporting framework of aërial leaves: an irritant in the eye is washed out by an increased secretion of tears; in the gastro-intestinal tract by purging and vomiting: plants and trees that have been seriously injured tend to reproduce, they flower: hunger prompts the finding of food to neutralize the uncomfortable

[11] Cited by Thompson: *loc. cit.*

feeling. More particularly, at the psychological level fear prompts those activities that lead to safety: anger causes behavior calculated to overwhelm the enemy: the desire for money brings about conduct calculated to acquire it: the desire for food causes conduct looking to its procurement: love prompts the acquisition of the loved object: lonesomeness causes the individual to seek companionship: pain induces the sufferer to seek relief. At the social level a shortage of labor causes a rise in wages with a consequent flow of laborers toward the zone of increased pay until the industrial tension is neutralized: a shortage of any commodity causes the price to rise and this attracts more persons to undertake its production thus increasing the supply and neutralizing the tension: increased production causes prices to fall and the stimulus to production being less the production falls off until demand and supply are more nearly equal: the demand for doctors produces a demand for medical schools: the medical schools produce a de-

mand for teachers: the teachers produce a demand for endowments to pay their salaries, etc., etc., each new factor operating as both a satisfaction of a demand and a creator of a new demand on the principle of the "multiplication of effects."

Every dynamic situation, therefore, can be resolved into two component factors; namely, a force tending to produce motion in a given direction and an equal force opposed to it and tending to produce motion in the diametrically opposite direction. The result depends upon which force, for the time being, is in the most advantageous position. The pendulum swings an equal distance in each direction but during its ascent gravity is always pulling against it until finally gravity overcomes the failing impetus which started it in that direction and it reaches the limit of its swing and starts in the opposite direction when the same thing is repeated. This is the dynamic principle underlying what we have termed the conflict at the psychological level but which is at the very basis of that "moving

equilibrium" we call life and the two opposing forces are seen of necessity to be ambivalent opposites.

This dynamic principle is laid down especially in the structure of the voluntary musculature—agonists and antagonists—and in the sympathetic and para-sympathetic nervous mechanisms, while at the psychological level it looms large in all our psychopathological states. It is basically, here, the eternal conflict between our instinctive desires and our ideals, and between selfishness and extreme individualism and the demands of the herd expressed in social usefulness and social esteem.

In the realm of pathology, both somatic and psychic, it is of immense significance though largely, as yet, unrecognized. Although I have not as yet undertaken a discussion of what is meant by the term disease I will use that word here in a way that will be generally acceptable and briefly indicate how this dynamic principle of the conflict as expressed in ambivalency and the law of

action and reaction will serve to throw a new light upon some of its problems.

The meaning of the dynamic principle of opposites in the realm of pathology is nothing less than this: that force, energy itself is neither good nor bad. Goodness and badness depend upon the uses to which energy is put, whether it is employed for constructive or destructive ends. The electric energy that flows along a copper wire may be used to turn the wheels of a factory that not only turns out a useful product but employs thousands of persons or it may be turned into the wires of an electric chair for the purpose of destroying a human life.

If good and bad are ambivalent opposites, if, in terms of energy they represent forces of equal strength that are always found in opposition then it must follow that disease must itself create the forces that make for its cure. This means that, instead of looking at disease as wholly bad, if we will only extend our vision to include the opposing forces which it brings into operation we

will see a side to the total situation that is as good as the disease appears bad. In a sense, of course, this is known for we know already much about the defensive mechanisms of both mind and body, but the fact frequently escapes our notice because, I believe, it has not been erected into a principle and so made fully conscious. We know it only at times only vaguely or not at all. We need to know that we know it by having it presented to our minds clearly in the center of our field of conscious awareness so that it will be available and usable at all times.

What, more specifically, is meant by disease creating its own cure? We are familiar with leucocytosis as a defense mechanism against infection and the manufacture of anti-bodies for the same purpose. Such concepts are well known. The beneficent effects of disease are less apt to be recognized when they occur on a different plane than the consideration of the disease. For example, if gonorrhea is considered solely as an infection its social significances will

not be seen. One of these is beneficent; namely, its sterilizing effect. On the whole this disease sterilizes the unfit, the prostitute and the feeble-minded. In fact it is open to question whether, taking all things into consideration, the eugenist could do better. It is true that many who are of good material are caught in the net but by and large it seems to work towards beneficent ends. One or two more illustrations. Dr. Trudeau says in his autobiography that he would not give the wealth of the Indies in exchange for what tuberculosis had meant to him despite the fact that he had fought with it for his very life for half a century and that most of his family died of it. He means, of course, that as a result of the disease he was brought into activities and associations that were invaluable to him. We might add that the illness developed in him certain traits of character which made him the great man in American medicine that he became. Mr. Beers, the founder of the Mental Hygiene movement, whose story is so well known, was

the sufferer from a severe psychosis for years. The very qualities that produced this psychosis were the very qualities that later, applied to putting over the mental hygiene idea, enabled him to inaugurate an international movement of untold potential good. These are some of the "forward ends" of pain.

Happiness does not mean just freedom from pain and success does not mean just avoiding failure. Both are positive terms and mean states to be attained. Success comes as a result of developing strength in overcoming obstacles not by having the obstacles removed beforehand. It is again an instance of action and reaction if we will look upon the whole matter as but a series of energy exchanges and transformations.

To summarize this chapter: man is very essentially a part of Nature and his development, whether physiological, psychological, sociological or economic is a part of the great process of Nature: natural laws are simplifications which, by appropriate grouping, enable man to handle an immense

amount of factual material without which he would soon reach his capacity to assimilate new matter: man does not make law, he discovers and formulates it: the pragmatic and heuristic advantages of the energic conception of the organism: the value of Newton's third law of motion as embodied in the theorem of Le Chatelier and the canon of physiology of Frédéric for the interpretation of biological events and in the field of pathology: the dynamic principle of the conflict: the beneficent aspects of disease.

CHAPTER VI

Disease and Adaptation

> Evil is that which resists the Evolution of the world, and fights a losing battle against the tendencies of things. It owes its persistence simply to this, that the end is not yet, that the purpose of the world-process is still being achieved, that the discordant elements are still being harmonized, and that hence what *is* cannot yet realize *what ought to be.—F. C. S. Schiller: Riddles of the Sphinx.*

Mercier long ago declared[1] that "doctors have formulated no definition of what is meant by 'a disease.'" This is still so and while I do not presume to be able to succeed in formulating an exact definition I do feel that, from what has been set forth up to this point, we are in a position to understand

[1] Cited by F. G. Crookshank: *The Importance of a Theory of Signs and a Critique of Language in the Study of Medicine* being Supplement II in C. K. Ogden and I. A. Richards *The Meaning of Meaning.* New York, 1923, Harcourt, Brace & Co., Inc.

much more clearly the real nature of what is called disease and, from the energy point of view that I am presenting, to see the whole problem in a new light that will disclose certain features much more clearly than heretofore.

In the first place, disease to use a rather well worn type of expression, is a failure, more or less complete, of adaptation. This is a more or less obvious statement but as ordinarily understood it means a failure of adaptation of the organism to its external environment such as, for example, a slip, a fall, and a broken bone the result of a lack of that sure footedness that would have made the slip impossible. The failure of adaptation, however, which our concept implies is much more comprehensive Disease, says Johnstone,[2] "is a disharmony, a disturbance of the general, unified functioning of the body—the indication of true partial activity." Here the word disharmony ex-

[2] James Johnstone: *The Mechanism of Life*. London, 1921, Edward Arnold & Co.

presses the controlling idea. In the instance of the man who slipped and fell and broke a bone there was disharmony in the sense that there was not an accurate adjustment between the surface on which he was walking and his muscular movements and the slip was the expression of this lack of harmony. The same sort of reasoning can be pursued in much less obvious situations. The individual who acquires a pneumonia from exposure has not been able to adjust his physiological mechanisms, particularly his heat forming and regulating mechanisms, to meet adequately the temperature of the environment: or he has not developed sufficient resistance against the organisms of the disease which are thus able to gain a foothold: or he has shown his lack of adjustment in not using good judgment and exposed himself longer than the circumstances required or failed to take off wet clothes promptly on coming in the house. All these can be seen to be errors of adjustment quite as clearly as a slip and fall, they can also be seen to be

partial activities. The slip was a failure in muscular coördination: the pneumonia was a failure of heat regulating mechanisms, immunity mechanisms, or judgment with reference to a specific situation: all partial activities.

From what has been said of the nature of the psyche as a reaction of the organism as a whole this latter failure of judgment might be thought to be a total reaction. It must be realized, however, that for the psyche not only is the body in its several parts environment but that the psyche as a whole is not necessarily in complete harmony with itself and for any aspect of the psyche any other aspect not in harmony with it has the value of environment.

This question of disharmony within the psyche opens up the whole question of disharmonies within the organism itself as over against the question of lack of harmony between the organism and its environment. It is no less a question than that of life and death itself.

This question of life and death has, I believe, some peculiar significances for medicine which have been overlooked. In the first place, if Newton's third law is universal in its application it means, what we have already come to suspect from a study of the psyche, that action and reaction are represented in the living organism at the somatic level by anabolic and catabolic activities and at the psychic level by what we have come to call conflict; namely, the antagonism between the two mutually opposed tendencies of opposite sign, the concrete instinctive drives on the one hand and the ego ideals that represent the socially useful sublimations of the energy of the instincts on the other. This psychic conflict is adequately visualized as an opposition of energies each striving for the mastery. If one succeeds the personality is degraded, if the other succeeds the personality is stepped up, if neither is strong enough to dominate either some compromise is effected or the personality and too not seldom the soma is torn

to pieces and perhaps destroyed as a result. Complete failure at the somatic level means somatic death, at the psychic level mental, moral, or spiritual death and in the psychoses expresses itself by suicide.

Somatic death means only the death of the individual because the somatic potentialities of the individual do not perish as they are laid down in the germ plasm and survive the death of the individual. In like manner death at the psychic level only refers to the individual for the influence he has exerted upon his fellows in person and that which is represented in his works lives after him. So therefore death is not a unitary concept. There may be somatic, mental, moral or spiritual death and too there may be partial deaths. The loss of an arm is a partial somatic death. The harboring of a delusional system is a partial mental death. Just, therefore, as we have healths as well as diseases, so we have deaths which may be of different parts of the organism and of different degrees, and lifes which are lived at any degree of fullness.

From this point of view anything that makes for somatically anabolic or psychically creative processes makes for life and *per contra* anything that makes for somatically catabolic or psychically destructive processes makes for death. In its fundamentals, therefore, the conflict that lies at the basis of life, that is represented in the term adaptation in the sense of the overcoming of difficulties or obstacles, is a conflict between tendencies that make either for life or for death.

This question of life and death has been argued from many points of view. The physicists have insisted that, according to the second law of thermo dynamics; namely, "The entropy of the Universe tends to a maximum," the universe was running down. This means, simply, that all transformations of energy tend to the degradation of the energy involved until finally all energy becomes transformed into heat which is dissipated throughout the universe thus equalizing differences in temperature and so tending

to an equilibrium at a uniform temperature thus making it unavailable for any further work. Weismann believed in the practical immortality of the protozoa and that death had come to be hereditary in the higher animals because of the uselessness of immortality when sexual reproduction had come upon the stage and too because of its practical value to the race. Immortals would necessarily, from time to time, suffer deprivations and losses of parts of the body which would mount up until finally a vast number of the species would be hideously mutilated. Death at least prevents such an eventuality. Freud associated death with the soma and life and immortality with the germ plasm.

Inasmuch as all living things die there must be some tendency or direction which they show that eventually leads to death. Freud[3] has identified the self preservative or ego instincts with those making for death and the race preservative or sexual instincts with those making for life.

[3] S. Freud: *Beyond the Pleasure Principle.*

However this riddle may be finally solved it would seem that disease, as failure of adaptation either to external or to internal circumstances, must be thought of as on the side of death. This way of looking at the situation considerably enlarges the concept of disease. It of course does away entirely with any such idea as disease entities. This idea I will not attempt to refute as it seems as if it was sufficiently in disrepute. Disease can only be that state of the organism that for the time being, at least, is fighting a losing game whether the battle be with temperature, water, microörganisms, disappointment or what not. In any instance it may be visualized as the reaction of the organism to some sort of energy impact, addition, or deprivation. The symptoms of disease, then, are the sign of this combat and largely, at least, directly or indirectly signs of the way in which the organism is resisting destruction and combatting death. Symptoms as such, then, instead of being symptoms of disease, using disease in the sense of

an entity, and therefore bad and indicative of dissolution, need to be looked at as beneficent in essence for they indicate how the organism is trying to save itself from the inimical influence by which it is attacked.

This enlarged concept of disease means that any destructive process whatever, no matter how small or of how short duration, comes within the meaning of the term. Not only are pneumonia and typhoid fever diseases in this sense, so is a broken leg or a cut or bruised finger: not only are paranoia and schizophrenia mental diseases but so is any attack of temper tantrums or any yielding to destructive emotions of the quality of hate.

Similarly the symptoms ordinarily credited to disease such as pain, leucocytosis, temperature, confusion, exaltation are not really symptoms that belong to the disease as such but indications of the way in which the organism is reacting to the particular inimical agency. From this point of view they have a beneficent significance and we are brought again to a consideration of the beneficent aspects of disease.

To summarize: Disease is a failure of adaptation both to conditions without the organism and to conditions within, it is a form of partial activity: the history of the organism is a continuous conflict between two sets of tendencies one making for life, the other making for death: conflict then lies at the basis of life: death may involve any part of the organism or be of any degree so that as we have many diseases so we have, in the same sense, many healths, and as we have many deaths so there are many lifes: any manifestation of energy which makes for the destruction of the organism is in the direction of death and the symptoms of disease are the signs of the reaction of the organism to the particular noxa. Symptoms therefore present indications of beneficent effort, action.

CHAPTER VII

Reversibility and Irreversibility

> If one is sufficiently lavish with time, everything possible happens.—*Herodotus.*

Before proceeding further with an attempt to interpret disease it seems worth while to discuss briefly the question of reversibility and irreversibility because this matter has bulked so large in discussions of the nature of life.

I referred in the last chapter to the second law of thermodynamics, or Carnot's principle as it is called, which states in effect that in any transformation of energy there is a degradation of energy in the direction of heat and that always there is a loss of certain portions of heat which becomes diffused and forever unavailable for further work. Energy must flow from above down, that is in the direction of heat, and from a warmer to a cooler body. The energy that is lost is dis-

sipated in the universe which thus tends to a temperature equilibrium, all of which means that the universe is running down and will ultimately come to an end when all its energy is used up.

If I should happen to sit down to my breakfast cup of coffee fifteen or twenty minutes late I should find the coffee, if it had been poured, had pretty well cooled off. Its heat had been dissipated to the cooler surrounding air of the room. Energy had flowed from the hot coffee to the cooler air, the coffee has cooled and the air had correspondingly been warmed. Now when it is said that this process is irreversible it does not mean that the reverse order of events is unthinkable or that it is mathematically speaking impossible. The event as it has happened has meant the movement of untold millions of molecules constituting the coffee at a certain rate and transferring their energy to the slower moving molecules of the air and it is of course entirely conceivable that those selfsame molecules should move in an

opposite direction and that the heat should flow from the room and warm up the cup of coffee. As a matter of fact, however, this never happens. If we knew the number of molecules involved the probability of this particular arrangement or any other could be calculated and it would be sure to be so highly improbable as to account sufficiently for its never happening. For example, ten white marbles and ten black marbles can be arranged in more than two million million million different ways; and the number of molecules in one cubic centimeter of gas at 0° temperature and atmospheric pressure is 3×10^{19}. If each of these molecules were examined for only a single second it would take twenty thousand million human lives to complete the task.[1] Now add to this the further complexity of considering them in groups of various sizes, etc., etc. We are reminded of "the miracle of the typewriting monkeys." This is the query: Suppose we have a million monkeys and set them to

[1] Guye: *Physico-Chemical Evolution.*

hitting the keys of a million typewriters. How long would it take to produce in this way exactly all of the volumes as they exist in the library of the British Museum.[2] The chances of one cup of coffee warming up spontaneously are about the same as our chances of reproducing a volume in the British Museum by this method—still we cannot say that it is impossible or inconceivable.

As Professor Royce says:[3] ". . . . the second law of the theory of energy is now generally regarded as essentially a statistical law. So viewed, the second law of energy becomes a principle stated wholly in terms of the theory of probability. It is the law that the physical world tends, in each of its parts, to pass from certain less probable to certain more probable configurations of its moving particles. As thus stated the second principle . . . . becomes a law of evolution."

[2] Cited by Guye: *loc. cit.*
[3] Cited by Lotka: *loc. cit.*

This sort of application of mathematical principles, in this case the law of averages applied to large numbers, does not help very much to an understanding of the phenomena of life or of mind. Instead of helping to an understanding of how things do actually occur it helps us to appreciate the reasons why they do not occur. Why, for instance, "an isolated system cannot pass twice through exactly the same state"[4] and makes quite understandable the definition of evolution as "the history of a system undergoing irreversible changes."[5]

As a matter of fact life does contradict Carnot's principle and much effort has been expended to try to prove how it does so. Guye[6] cites particularly the occurrence of fluctuations and states that the law of large numbers falls down when applied to more and more heterogeneous material: that the high efficiency of the human machine indicates

[4] Guye: *loc. cit.*
[5] Lotka: *loc. cit.*
[6] Guye: *loc. cit.*

that it is probably not a thermal machine: and that the discrepancy is due perhaps to the fact that Carnot's principle holds only for magnitudes of a relatively high order but that it tells us nothing of the law of motion of the individual particles or molecules, that is of individual as opposed to average actions. Maxwell introduced the concept of a demon that could arbitrarily arrange the particles in opposition to the principle of averages and the hypothesis of a vital principle is little else than the substitution of a verbal device for accounting for such results, namely, the substitution of choice for chance. As Bergson[7] puts it: "Life as a whole, from the initial impulsion that thrust it into the world, will appear as a wave which rises, and which is opposed by the descending movement of matter." Or to quote Schiller[8] again:

> Hence Naturalism is sooner or later doomed to failure. It leaves out the higher aspects of things and in the end

[7] Henri Bergson: *Creative Evolution*, New York, 1911, Henry Holt & Co.

[8] F. C. S. Schiller: *Riddles of the Sphinx*.

these cannot be omitted. For the objects of the physical sciences forming the lower orders in the hierarchy of existence, though more extensive, are less significant. The atoms of the physicists may indeed be implied in the organization of conscious beings, but in a subordinate capacity: a living organism exhibits actions which cannot be formulated by the laws of physics alone; man is material, but he is also a great deal more, to wit, alive, psychical, and moral. Again, all bodies gravitate, but the activities of living to say nothing of rational, bodies cannot be explained by the action of gravitation alone. So chemical affinities are presupposed in biological actions, but yet life is something more than and beyond chemical affinity. Thus it is the same inherent flaw of the method which is displayed, not only in the palpable inadequacy of explaining biological facts by chemical or mechanical facts, but also in that of explaining the rational or moral by mere biology.

This idea of the inability of explaining the higher by the lower is so important, and, I think, so responsible for much bad thinking in medicine, that I will quote Schiller[9] further as he so beautifully expresses it. He says:

Our difficulty then arises from two main causes: (1) Our imperfect knowledge of the lower; (2) Our imperfect attainment of the higher.

[9] *Loc. cit.*

These two causes conspire to make most of the facts in the world unintelligible. We have to accept them as facts for which we can give no reason. Why does gravity vary inversely as the square of the distance? A simple fact like this will defy explanation for many an age, for it is the lowest and most general of physical facts, and *therefore* the last to be rendered intelligible from the point of view of the higher. For just as in ascending a mountain the higher peaks are the first to be perceived, the first whose groupings can be understood, just as it is not until we reach the summit that we rise to a free purview of the whole, and that the interconnexion of the lowlands and the direction of the valleys can be made out; so in philosophy we can only catch partial and misleading views of what is below, while we toil through the dense forest of prejudice, and can only gain mysterious hints of what lies beyond, while what is above is shrouded in the mists of early morning.

And not only are we hampered by our avowed ignorance of the lower, but in view of the slight deference which the scheme of things pays to man and his desires, we must admit also that little progress has been made in the attainment of the higher. We are after all far nearer to the beast than to the angel, far closer to hell than to heaven. We can feel the throb of brutal instincts, we can conceive the anguish of undying torment; but the calm of superhuman virtue leaves us cold, and visions of eternal bliss seem empty and unmeaning.

Yet this is the nature of things inevitable. The higher can in a way understand the lower, by tracing in it the germs the higher has developed. But the lower cannot in the same way *anticipate* the higher.

I have taken this pains to define the concept of irreversibility because it is so much in evidence in the literature and for the purpose of laying the groundwork for the next chapter. But before proceeding I must revert to the subject of life and death, touched upon in the last chapter, for the purpose of adding some further considerations.

Child[10] is not altogether willing to admit with Lillie, Loeb, Driesch, Schultz and others that development in animals is a reversible process. Inasmuch, however, as the complexities which have been built up by the process of differentiation may be disintegrated by the process that he calls dedifferentiation, he believes the process of development is regressible. Differentiation is progression, and dedifferentiation regression, but perhaps through stages very different from the stages of progression, therefore the term regressible is preferable to reversible.

Differentiation is the process of growth,

[10] *Loc. cit.*

specialization, morphogenesis and leads to senescence and death, while the process of dedifferentiation is accompanied by physiological rejuvenescence. In other words, the process of growth, differentiation, specialization, or better the accumulation of function as structure, the structuralization of function, is accompanied by a gradual slowing down of activity, of the metabolic rate. This is well shown in the planarian worms. Starvation brings about a dedifferentiation in old worms. Now when these worms are fed again they show by all tests that they have become younger. In the same way Child shows by many examples that organic reproduction is preceded by dedifferentiation. For example, the formation of so-called adventitious buds may take place in *Begonia* from the epithelial cells of the leaf. The epithelial cells are highly differentiated, but before the buds are formed they lose their differentiated characters and resume an embryonic condition—they dedifferentiate.

In analyzing the process of reconstitution

in *Planaria dorotocephala* Child found that a whole series of animals could be experimentally produced from pieces which presented at one extreme a normal head and at the other extreme were headless. Experiment proved that the head-frequency was dependent upon different degrees of retardation or inhibition of the metabolic rate. By immersing the pieces in weak solutions of cyanides and narcotics the head-frequency could be accurately reduced in proportion to the strength of the solution. It was proven, too, that a head developed at the end of the piece which in the original worm was nearest the head (apical) and that the amount of dedifferentiation was greater for the production of a head than when a head was not produced. Many other equally interesting points were brought out. Such experiments confirmed by many others show again that the head end is the place of highest rate of metabolic change and therefore is not only the controlling factor in the organization, but the most modifiable, a conclusion

which seems to be of the greatest significance for psychotherapy.

Of special interest for psychotherapy, aside from the proof of the supreme importance of the head end, is the phenomenon of dedifferentiation. This phenomenon is what we are actually dealing with all the time in our efforts to reconstruct our patients. The energy bound up in bad habits of thinking and feeling cannot be used for constructive ends until those habits are first destroyed, thus releasing the energy so that it can be used for a new structure. This is precisely the phenomenon of dedifferentiation. We cannot build a new house from the bricks of an old one without first tearing down the old structure so as to render the bricks available.

And finally, Child's work emphasizes in a way that seems to me most pertinent to present-day issues the supremacy of the head end. This supremacy is naturally of the first importance to the fundamental issues of a scientifically grounded psycho-

therapy. This branch of therapeutics need no longer be arbitrarily limited to dealing with certain so-called functional disturbances of obvious psychological origin. It is apparent that no such limitation of its activities can any longer be demanded. The extent to which what are now believed to be organic conditions can be influenced through the psyche remains to be worked out in actual situations. Such work must no longer be prevented because of the prejudices of preconceived opinions without adequate facts to base them upon.

These considerations indicate that the concept of the ego or self-preservative instinct as death tendency and the sex or race-preservative instinct as life tendency has much to be said for it. The germ cells being least differentiated are the youngest and have the greatest possibilities: the body cells being highly differentiated are, by the same token, so much the nearer death. In a very real sense, therefore, the child is father of the man, because the child, relatively

undifferentiated, is much closer to the common stuff of which we are all made. As he lives he differentiates and by so doing not only becomes more individual in the sense that he becomes more unlike others but departs further and further from this common ground. Butler says[11] very beautifully:

> It is the young and fair, then, who are the truly old and the truly experienced; it is they who alone have a trustworthy memory to guide them; they alone know things as they are, and it is from them that, as we grow older, we must study if we would still cling to truth. The whole charm of youth lies in its advantage over age in respect of experience, and where this has for some reason failed, or been misapplied, the charm is broken. When we say that we are getting old, we should say rather that we are getting new or young, and are suffering from inexperience, which drives us into doing things which we do not understand, and lands us, eventually, in the utter impotence of death. The kingdom of heaven is the kingdom of little children.

To summarize: Carnot's principle has been invoked to explain organic as well as inorganic transformations of energy: this prin-

[11] Samuel Butler: *Life and Habit*, New York, E. P. Dutton & Co.

ciple is essentially statistical, its conclusions are based on the law of averages of large numbers: these statistics instead of explaining how things occur rather help to an understanding of why they do not occur: the facts of life contradict Carnot's principle: Carnot's principle was worked out for inorganic phenomena, it holds, perhaps, in this domain, in the domain of the not-living and so is not applicable to explain the living: a law to explain the phenomena of life or mind must be worked out in the dimensions of life and mind: further consideration of the problems of life and death disclosed additional reasons for regarding the ego-instinct as tending in the direction of death and the sex-instinct as tending in the direction of life: these tendencies are correlated on the structural side by differentiation and dedifferentiation respectively.

CHAPTER VIII

Disease and Reversibility

> We cannot reason with our cells, for they know so much more than we do that they cannot understand us.—*Samuel Butler: Life and Habit.*

What has reversibility and irreversibility, which were discussed in the last chapter, to do with disease? A consideration of disease in relation to this concept of reversibility will, I think, serve to throw some further light upon the nature of disease.

In the first place we must revert, in our consideration, to the principles, laid down by Child, underlying the formation of the dynamic gradient. Now, as we have seen, the constant flow of energy along the pathways laid down in the protoplasm along the lines of force of the dynamic gradient finally results in the laying down in structure of the gradient pattern, or what I have called the structuralization of function. The dominant

gradient is later represented in structure by the central nervous system. "The functional dominance of the central nervous system in the later life of the animal is then simply a more highly specialized expression of the primary relation of dominance and subordination existing at the beginning of individuation between regions of high and those of lower metabolic rate.[1]"

While this main gradient is being structuralized the innumerable other gradients of the various organs are also being laid down. Well recognized functional gradients besides those of the nervous system are those of the circulatory, the gastro-intestinal and the genito-urinary systems.

While all this is going on, however, certain other things are taking place of great importance. To quote Child[2] again:

> As soon as local differences in chemical constitution of the protoplasm arise, whether they result from differences in metabolic rate or from differences in character

[1] Child: *Individuality in Organisms.*

[2] *Loc. cit.*

of the transmitted change, the relations commonly called chemical correlation, consisting in the production and transportation of different specific substances, begin to play a part, and from this point on these chemical relations are factors of great importance in determining the character of the different parts, until in the adult stage of the highest forms, man and the other mammals, the complexity of chemical correlation is bewildering, as the work of recent years on hormones and internal secretions has clearly demonstrated. From the point of view developed here chemical correlation is, however, a secondary factor, for the underlying order which determines the orderly character of chemical correlation consists in the quantitative gradients which arise in the living mass.

The meaning of this statement from our point of view is just this. Chemical transportation as a means of correlation begins at practically the same time as does the laying down of the dynamic gradient in structure but it remains largely in its original state, so far as lack of structuralization is concerned. Chemical transportation continues, as it was in the beginning, a means of correlation but, of course, avenues of transportation, the blood stream, have been developed to expedite transportation when

the distances become very great and cell boundaries must be crossed. Therefore, we find a highly specialized and structuralized gradient functioning beside a very old, primitive method of chemical transportation. What can this mean for us? A little further analysis will be necessary to understand.

In the first place we must think of transportative correlation as a very old, archaic, method, consisting in influencing a distinct part by transporting something to that part. The method is essentially as clumsy and cumbersome as sending a letter from city to city by courier would be as compared to a night letter sent by wire. Nevertheless all of the business of the organism is never laid down in structure. This process takes long periods of time and the necessity for adjustments that existing structure cannot care for is continually arising and in the face of such an emergency there is nothing to do but to fall back upon the old, primitive method. Internal changes in the system lag behind determining external changes.[3] When this

[3] Lotka: *loc. cit.*

occurs in society as, for instance, the long time it took after the frequency of industrial accidents became known to create an adequate system of industrial insurance, it is known as "cultural lag," In the instance under discussion it might appropriately be termed structural lag. It is obvious, therefore, that this lag or delay in laying down structure to handle situations, because they have not yet occurred with sufficient frequency, places at the disposal of the organism the raw material, so to speak, of adjustment capacity. There is never a time, in other words, when, in a given situation, unless it be a very simple one, the organism is wholly dependent upon definite structural pathways and is therefore rigidly determined in its reactions.

In order that we may gain some idea of the extent of chemical correlation in the organism I will again turn to Child,[4] who says:

> Modern investigation of the chemistry of the organism has demonstrated that the chemical correlations, as

[4] *Loc. cit.*

they are commonly called, which exist between its parts are most various and complex and often highly specific in character. Certain parts produce substances which are essential to the normal activity or structure of other parts, and the statement is frequently made that every organ in the body is an organ of chemical correlation, which means merely that it produces something which plays a rôle in making other parts what they are.

Here we have a statement that means, among other things, that, as we might expect, each cell plays its part in conditioning all the other cells of the body and in its turn is conditioned by all of them. The structural factors of this type of correlation are, in the main, the endocrine glands with their respective hormones, and the vegetative nervous system. So far as we know these mechanisms served by the vegetative nervous system and the endocrine glands we know they present infinite possibilities for correlative reactions not only because of the several chemical substances, the hormones, that are elaborated by the glands but also because of the innumerable patterns of interrelation between the glands, so that we find, not

only all manner of hyper, hypo, and para states of secretion individually and in combinations but too all manner of substitution and compensation patterns. In this field, surely, anything like absolute determinism seems to be replaced by the possibilities, at least, of indetermination.

Now for a similar brief examination of possibilities in the central nervous system. The head end is metabolically the most active part of the gradient, it is where things are happening. Function that is structuralized may be left behind, as it were, but in the van of progress, at the head of the procession, nothing will do but there must be a forging ahead, an ever increasing power of adjustment. This is what we know actually happens but what do we know about the structural background for such possibilities?

In the first place the primitive nervous system, such as the nerve net of polyps and jellyfishes,[5] is reflex in type in the sense that

[5] C. Judson Herrick: *Neurological Foundations of Animal Behavior*, New York, 1924, Henry Holt & Co.

there is a definite unbroken pathway between receptor and effector so that a definite response follows invariably upon a stimulus. Somewhere along the line, however, there was introduced the synaptic type of nervous system such as is found in the higher animals and in man. In this type of nervous system the neurons exist as anatomically distinct structures but functionally related through the synapses. These synapses are the places at which the end brush arborizations of terminal fibrils of neurons approach very close to one another. Some have supposed they fuse at these points. Nerve conduction is effected across the intervening space but conditioned by the state of the tissue therein which has been called the synaptic membrane because, whether it deserves that name or not because of its structure, it functions as does an animal membrane. Inasmuch as a single nerve cell, through its fibre terminals, thus comes into possible functional relation not with one but with many other nerve cells the structural groundwork is laid here

for indetermination also. Whether a nerve current that starts along a given path will, when it comes to the end of the particular fibre along which it is travelling, take one or another pathway depends upon the physico-chemical states of the various synaptic membranes that are interposed in its path. Here we find a mechanism that causes delay and it is "just in this interval, this space between perception and reaction, this momentary halt, that all our mental life, our images, our ideas, our consciousness, and assuredly our religion and our art, is built up."[6]

Here there are two pretty clear indications of the existence of mechanisms for adaptation, one very old and of primitive type, the other representative of the highest kind of adaptive mechanism in the cerebral cortex, both of which are calculated to allow the organism to escape from the absolute domination of structure and permit it a considerable leeway in the direction it will take in

[6] Jane Ellen Harrison: *Ancient Art and Ritual*, New York, 1913, Henry Holt & Co.

making its adjustments. Now the connecting link between these extremes is the affect. It is the affect which releases, for example, the adrenalin into the blood stream and so sets going that series of changes that prepare the body for flight or for fight in the presence of a dangerous enemy, and it is the affect that determines which direction the individual will take in respect to the enemy, whether he will approach him to give combat or turn and run to seek safety. Without further illustrating the possibilities for reaction as a result of this linkage of chemical transportation, choice of pathway at the synaptic junction, and affect I will rest with the statement that it is in this region that the responses of the organism are relatively indeterminate as compared with those reactions that depend upon definitely laid down structure.

Now what has all this to do with the subject of this chapter? "Professor Royce once remarked that almost, if not quite, the total meaning he could extract from the term

functional was the idea of reversibility."[7] This is the answer to the query for it must be plain from this discussion that the vexatious distinction between organic and functional disease is very much illuminated by approaching the problem in this way. When function has become structuralized and is thus disordered we are dealing with organic disease: when function which has not become structuralized but is nascent, so to speak, is disordered then we are dealing with functional disease. Of course much might be said of the 'tween states where function is on the way to structuralization but the structure is as yet very unstable. From the very statement of the case it is obvious that such conditions must occur for of necessity the functional must at places merge into the structural. I will not, however, discuss this aspect of the situation but will be content to set forth the philosophical principle feeling quite confident that, if it is correct, as I believe

[7] E. E. Southard and Mary C. Jarrett: *The Kingdom of Evils*, New York, 1922, The Macmillan Co.

it to be, it will serve to help astonishingly in the comprehension of a distinction that, in the past, has always been a subject of sterile argument. There is one further, and very important, implication of this distinction between organic and functional. Reverting to Chapter II in which a tentative scheme for the classification of the sciences was offered and hitching up the idea expressed in that classification with our definition of functional disease as of threefold constitution of chemical transportation, synapse choice, and affect it seems plain that, on the principle that the larger contains the lesser or the higher includes the lower, the only therapeutic approach to functional disease is by way of the psyche. It is the same situation to which I have already several times referred. The affect is not only the connecting link between chemical transportative mechanisms and synaptic choice but it is the common element of all functional diseases and while a particular disease may seem to be altogether or predominantly metabolic, let us say,

still they all have psychological factors and I believe that experience will demonstrate that when under therapeutic attack they continue to show up as predominantly metabolic that they are merging toward the structural or organic.

Again, all sorts of illustrations could be given to show not only how various physiological disturbances had been modified by psychotherapeutic measures but how conditions that looked to be organic were so modified. I will rest by merely reminding the reader of the enormous number of confessedly functional diseases that are so recognized and also of how many of them are being now treated without the slightest consideration of the psyche. The psyche certainly must come in for consideration in all this group leaving the gross organic situations only for the surgeon and even here the psychological coöperation of the patient will be found to be of no small benefit.

Organic injuries are irreversible. Highly specialized cells and tissues are never repro-

duced when once destroyed. Scar tissue replaces organic defects and then, if a return to normal functioning takes place it is by a process of readjustment and compensation on the part of remaining organs or tissues. The process of recovery of functional disease that I have implied takes place because the disordered processes are reversible. They are not really reversible in the mathematical sense or in the sense that a cinematographic film is reversible. They are only reversible in a practical sense to which the term regressible is better suited. There is a return to what, for all practical purposes, is such a state of health as existed before the illness. Actually the state is often quite different and, in fact, often very much better than the previous state because readjustment has taken place plus all the advantages of a more adult and better informed intelligence.

I will end this chapter with a quotation from Samuel Butler's extraordinary novel *The Way of All Flesh.*[8]

[8] If for changed and unchanged we substitute changeable and unchangeable we should have the meaning expressed in these pages by functional and organic.

All our lives long, every day and every hour, we are engaged in the process of accommodating our changed and unchanged selves to changed and unchanged surroundings; living, in fact, in nothing else than this process of accommodation; when we fail in it a little we are stupid, when we fail flagrantly we are mad, when we suspend it temporarily we sleep, when we give up the attempt altogether we die. In quiet uneventful lives the changes internal and external are so small that there is little or no strain in the process of fusion and accommodation; in other lives there is great strain, but there is also great fusing and accommodating power; in others great strain with little accommodating power. A life will be successful or not according as the power of accommodation is equal to or unequal to the strain of fusing and adjusting internal and external changes.

The trouble is that in the end we shall be driven to admit the unity of the universe so completely as to be compelled to deny that there is either an external or an internal, but must see everything both as external and internal at one and the same time, subject and object—external and internal—being unified as much as everything else.

To summarize: structuralization begins as a process at the very time life itself begins: chemical transportation as a means of correlation begins almost if not quite as early: the process of structuralization is in the

direction of determinism: structuralization lags behind the determining factors that condition it: this I have called structural lag: in the central nervous system the presence of synapses, many of which are present in the path of every nerve current, conditions a relative indetermination of response: the connecting link between chemical transportative means of correlative and synaptic indetermination is the affect: when function which has become structuralized becomes disordered we are dealing with organic disease: when function which has not become structuralized becomes disordered we are dealing with functional disease: chemical transportation, synapse choice, and affect are the elements in the threefold constitution of functional disease: the common element here is the affect: on the principle that the higher contains the lower psychotherapy is the rational approach to functional disease.

CHAPTER IX

The Symptoms of Disease

> Words, words, words, are the stumbling blocks in the way of truth. Until you think of things as they are, and not of the words that misrepresent them, you cannot think rightly. Words produce the appearance of hard and fast lines where there are none. Words divide; thus we call this a man, that an ape, that a monkey, while they are all only differentiations of the same thing. To think of a thing they must be got rid of: they are the clothes that thoughts wear—only the clothes. I say this over and over again, for there is nothing of more importance. Other men's words will stop you at the beginning of an investigation. A man may play with words all his life, arranging them and rearranging them like dominoes. If I could *think* to you without words you would understand me better.—*Anonymous* (*quoted by Samuel Butler: Life and Habit*).

Having examined the concept of disease from various angles it now seems fitting that we should discuss the symptoms of so-called

disease. I say so-called disease because, as I have already intimated, diseases are not entities and symptoms are spoken of as diseases because of the very erroneous and mischievous belief that they are.

> It is a vulgar medical error to speak, write, and ultimately to think, as if these *diseases*, these *general references* we *symbolise*, were single things with external existences. . . . . That our grouping of like cases, as cases of the same disease, is purely a matter of justification and convenience, liable at any moment to supersession or adjustment, is nowhere admitted; and the hope is held out that one day we shall know all the diseases that there "are," and all about them that is to be known.[1]

Disease can not of course exist of itself without there being a person diseased. Diseases do not exist outside the organism and invade it. Disease is what happens when the organism comes into conflict with some inimical agent and the symptoms that arise are not signs of the presence of an invading disease but signs of what is going on in the organism as a result of the conflict.

[1] Crookshank: *The Importance of a Theory of Signs and a Critique of Language in the Study of Medicine. Loc. cit.*

If this is a fair statement of the situation and if we may continue to assume that the organism is an energy system and, too, not a closed system but a part of a larger system of which the environment is also a part, then symptoms can be understood as only signs of the type of reaction of the organism to certain changes in this system and as I have already indicated may be signs that point either in the direction of life or of death, that is, they may be beneficent in nature or they may be malign.

If further we continue in the assumption of energy as the basic fact back of all phenomena and that in this region of energy manifestation the law holds that action and reaction are equal and in opposite directions then we can understand this opposition of good and bad symptoms and how good and bad must only be a particular case of a general law that groups all symptoms in pairs of opposite sign. That is, if energy is either of action or reaction and these two are always in opposite directions then all symp-

toms, being manifestations of energy and so being one or the other, must group in pairs which are pairs of opposites or as they have been called pairs of ambivalent opposites. If conflict is at the basis of life, physical and mental, as I have indicated, then this conclusion seems to be inevitable. In fact we might expect to find that the whole organism was constituted along these lines and still further that the universe itself was so constructed. Benett in a little known book[2] has defended "the idea of evolution is the equal and parallel progression of opposites." There is much evidence for this view of which I will merely cite the following examples: the opposed actions of the two divisions of the vegetative nervous system, the sympathetic and the para-sympathetic or autonomic: the polarization of the neuron: the sensory and motor nerves: epicritic and protopathic sensibility: the muscle agonists and antagonists: the ego-instincts and the race-instincts: in short Thanatos and Eros.

[2] W. Benett: *The Ethical Aspects of Evolution*, Oxford, 1908, The Clarendon Press.

This expression of life in opposites has been preserved in language. Abel studied[3] the early forms of words and found this principle illustrated. Many of the old words are combinations of opposites such as altjung (= old-young), fernnah (= far-near), ausserinnen (= out-in), bindentrennen (= bind-separate) which came to mean respectively young, near, in, to bind up. Abel mentions a number of English words of the same sort, such as without, which is a combination of mit (with), and ohne (without). Mit he says originally meant with (mit) and also without (ohne). The word 'taboo' like the Latin 'sacer' or the Hebrew 'Kodaush' has the twofold meaning sacred and forbidden, unclean, uncanny.[4] Freud's[5] theory of taboos is that they are prohibitions enforced originally from without of acts which are as a matter of

[3] Karl Abel: *Ueber der Gegensinn der Urworte.* Referat by Freud in Jahrbuch f. psychoanalytische u. psychopath. Forschungen, 1910.

[4] Israel Levine: *The Unconscious.* New York, 1923, The Macmillan Co.

[5] S. Freud: *Totem and Taboo.*

fact strongly desired. He says, "The basis of taboo is a forbidden action for which there exists a strong inclination in the unconscious." This expresses the principle that the two opposites may one be in consciousness and the other in the unconscious, or that the content of either consciousness or the unconscious is, in relation to the other, of opposite sign.

As I have said elsewhere[6] conflict is at the very root and source of life, in fact it is the very stuff out of which life is made and, I might add here, ambivalency is the outward sign of this conflict, the pattern in which it is cast. As Ritter[7] very well puts it "Normality, both in function and in structure, consists not in rigid, invariable activities and organs but in a ceaseless play of constitutively antagonistic forces and structures. By this conception the whole life of the organism, physical and psychical, may be

[6] *Mechanisms of Character Formation.*

[7] William Emerson Ritter: *The Unity of the Organism*, Boston, 1919, Richard G. Badger.

crudely likened to the performance of the tight-rope walker, who depends on numberless balancing activities. Let the performer be really motionless in every part for one instant, and he falls."

The same idea, in respect to moral issues, is expressed by Butler[8] when he says: "People divide off vice and virtue as though they were two things, neither of which had with it anything of the other. This is not so. There is no useful virtue which has not some alloy of vice, and hardly any vice, if any, which carries not with it a little dash of virtue; virtue and vice are like life and death, or mind and matter—things which cannot exist without being qualified by their opposite. The most absolute life contains death, and the corpse is still in many respects living." William James[9] puts it: "A solemn state of mind is never crude or simple, it seems to contain a certain measure of its own opposite in solution. A solemn joy preserves a sort of bitter in its sweetness."

[8] *The Way of All Flesh.*

[9] *Varieties of Religious Experience.*

These illustrations reinforce the point of view of ambivalency and together with Newton's third law of motion, the theorem of Le Chatelier and the principle of Frédéric make it clear that symptoms must be so constituted that, if we but had the wisdom to understand them, to translate their hieroglyphs, we would not only get a statement of what was going wrong but also of what was taking place to correct the wrong. Each problem, as presented by the symptom, contains the indications for its own solution.

Certain other implications, as to the nature of the symptoms, flow from the principles thus far laid down. We concluded, among other things, that the psyche was as old as the soma and that for each situation there is as well a psychic as a somatic component. It follows from this that every disease, that is every reaction of the organism to a noxa, must be both somatic and psychic. This is a very imporant corollary because it calls attention to the necessity that all syndromes have psychic components, a fact little appre-

ciated by medicine as yet, and when feebly appreciated not understood. A word of explanation of what I mean by this statement.

The mental symptoms are usually understood only as they superficially and obviously manifest themselves and then they are acknowledged only as descriptive elements in the situation, rarely as having meaning or capacity for throwing light on the situation. No understanding of the psyche of the patient can be had unless the physician has at his disposal the main facts about the nature and governing laws of the unconscious and better some skill in technique that will enable him to find his way to this region. By unconscious I mean to use the term both in the narrower Freudian sense and in the large philosophical sense that includes in the concept the whole historical past of the psyche both individual and racial. The pathologist has learned to apply the temporal coördinate to his evaluations, to recognize poorly developed, immature, embryonal

tissues. The psychopathologist must do the same sort of thing. Touching this aspect of the situation Dr. Jelliffe and I have said, in the Introduction to our Text-Book:[10] The psychic level is the most complex. Its function is no longer simply one of integration of the various parts of the individual but at its highest, conscious level it has to do not only with the relation of the individual as a whole to his environment but more especially to his social environment.

At this level it has been the prevalent custom to think only of consciousness, and of conduct consciously regulated by intelligence. Ideas are symbols; they are symbols of the contemplated action on things, through which the individual comes to an efficient adjustment with his environment by controlling them. The symbol therefore becomes a carrier of energy which is translated into conduct.

The ways in which these psychic sym-

[10] S. E. Jelliffe and W. A. White: *Diseases of the Nervous System*, Philadelphia, 1923, Fourth Edition, Lea and Febiger.

bolizations work at the highest conscious levels are pretty well formulated in current psychology, and these ways work very well so long as there is nothing unusual the matter with the whole machine. The great error of the academic psychologist, however, has been to suppose that the matter stopped here. The lower animals exhibit most complex forms of behavior without its being thought necessary to ascribe conscious motives (intelligence) to them in explanation. Very complicated activities low down in the biological scale are ascribed to tropisms, while for man it has been supposed that what he did he consciously intended. Recent studies in psychopathology have shown the inadequacy of this conception, and it is thoroughly well established that lying back of consciousness is a much larger, a much more important territory which furnishes a psychic motivation of conduct, and, in fact that conscious processes as they are known to the individual are largely, if not altogether, determined by what lies in this region—the unconscious.

Psychic symbols—ideas, feelings—must therefore be traced farther back than the conscious level at which the individual is acquainted with them in order to understand their real meanings. Psychoanalysis is as important for the understanding of the construction of the psyche as dissection is for the understanding of the structure of the body, or chemical analysis for the understanding of the constitution of the molecule.

The greatest deficiency in the psychology of the nineteenth century relative to the understanding of human conduct has been the neglect of the unconscious.

For centuries man has marvelled and speculated and gathered observations concerning the exquisite subtleties of adaptation of plant structures to their environment. Students of nature have recorded in encyclopedic proportions the intricacies of Nature's story of the conduct of the lower animals from protozoa to highest ape. These activities have been relegated to tropisms and to instincts. Man alone has supposed

that he could explain his own conduct by reference to that which appears in his consciousness, unmindful of the millions of years of evolution preceding that which he has designated as his conscious activities.

With the help of the hypothesis of the unconscious, however, it has come to be recognized that the psyche has its embryology and its comparative anatomy—in short, its history—just as the body has, and in precisely the same way as in the case of the body this history has to be utilized before it can be understood.

So long as the unconscious failed to be recognized, just so long was the gap between so-called body and so-called mind too wide to be bridged, and so there arose the two concepts, body and mind, which gave origin to the necessity of defining their relations. Consciousness covered over and obscured the inner organs of the psyche just as the skin hides the inner organs of the body from vision. But just as a knowledge of the body first became possible by the removal of

the skin and the revealing of the structures that lay beneath, so a knowledge of the psyche first became possible when the outer covering of consciousness was penetrated and what lay at greater depth was revealed. As soon as this was done, the wonderful history of the psyche began to give up its secrets, and the distinction between body and mind began to dissolve, until now it has come to be considered that the psyche is the end-result in an orderly series of progressions in which the body has used successively more complex tools to deal with the problems of integration and adjustment.

Just as our view of body and mind as only different aspects of the organism as a whole naturally leads to the conclusion of the inevitableness of a psychic component as well as a somatic component in all symptoms, so now we must be prepared to find that our conclusions as to the oneness of the organism and its environment quite as inevitably lead to the conclusion that the symptoms must contain a component that

is to be recognized as of environmental origin as well as the component that is recognized as of the organism. I do not mean by this that when we find the organism of typhoid fever, or the bullet of the assassin, we gain anything by considering them as inclusions of the environment. I mean to call attention to much more subtle relations which are, so far as I know, practically unrecognized outside the field of psychoanalysis. I refer particularly to a considerable number of what appear to be accidents but which on analysis disclose the apparent accident as the fulfillment of an unconscious purpose. For example, there are the unlucky fellows who are always having something happen to them, injuries, bruises, broken bones. The analysis will often show that these are abortive attempts at suicide which the individual is prevented from carrying to a successful issue by fear or religious scruples.[11] Then there are the depressed and

[11] Oskar Pfister: *The Psychoanalytic Method*, New York, 1917, Moffat, Yard & Co.

desperate persons who have suffered a severe disappointment, the loss of a very dear love object, and who, deliberately though not with clear conscious awareness, expose themselves to wet and cold, over drink, over smoke, become unduly fatigued and go without sleep and so get so run down physically that they are the easy victims of infection. This is the method of what I call attenuated suicide. An examination of unconscious motives will disclose with great frequency connections of this sort that are characteristically amazingly subtle.

This point of view has been well set forth in another connection by Josey in his examination of the whole subject of the instincts.[12] He believes that the use of the concept "instinct" is inaccurate, misleading, and interferes with progress in thought and discovery in science. The concept of instinct has come to be used not unlike the way in which the savage used the concept

[12] Charles Conant Josey: *The Social Philosophy of Instinct*, New York, 1922, Charles Scribner's Sons.

of spirits. Primitive man, in his animistic way of thought, attributed everything that happened to a spirit, and so by a process of refinement and resymbolization we have come at this day and age to speak of instincts and forces as the causative factors behind events. He undertakes to prove that activity is not caused by a force or an instinct resident in the actor, but that it is a function of the situation in which the living being happens to be at the moment, and that the condition of the living being at the moment is a part of the situation and that condition may be expressed in terms of structure, physiological condition and experience of the organism, and the other factors are the confronting situation. Taking all these together any particular activity must be explained in terms of them rather than any hypothetical forces and instincts. We come to each particular problem of human activity with the factors that are immediately then and there involved, and our explanation of that activity must be reached by a knowledge

and understanding of these factors. This means not only the obvious factors but the factors in the unconscious, the factors embodied in the social traditions and so forth. In proportion as they are all known will the real meaning of the activity reveal itself.

Just a word in closing as to the meaning of the concept "accident." I have already indicated that many of the occurrences that seem to outward appearances, to be accidental are found on analysis to be really intended and brought about by motives that are active in the unconscious.

By accident we can only mean an occurrence which results in two systems colliding which have each been pursuing an independent course without reference to the other. A and B, for example, are systems, each revolving in its own orbit and each having, let us say, a certain conscious control of its own movements within that orbit but, too, having no control outside it. Each is in all these ways quite similar. Neither one, let us say, knows anything of the other, its laws

of motion, or its whereabouts. Now if while each is pursuing its own affairs within the limits of its own system they collide it can not be because collision was the objective of either. The cause must have been a cause that operated outside their orbits and so transcended both. They are in much the same position of being at the mercy of such a causative factor as would be inhabitants of a universe constructed in two dimensions only if a bomb were dropped upon it from above. Knowing nothing of the third dimension they would be both unable to control such occurrences or to understand them. Here it would be a question of dimensionality. Anything that has its cause outside of the dimensions with which we are familiar must not only be uncontrollable by us but unknown and, while our lack of information of the dimension continues, unknowable. Such an occurrence would be, for all practical purposes, a pure accident. Such a pure accident, however, it is seen does not, by any means, preclude an efficient cause in a higher

system or another dimension. An example would be the acquisition of rabies from the bite of a mad dog.

To summarize: Diseases are not entities: the classification of diseases is purely a matter of convenience: what are known as diseases are the results of what happens when the organism comes in contact with inimical agents: the signs and symptoms of this conflict arrange themselves on the side of either life or death: all symptoms may be grouped in pairs of opposites in accordance with the law of action and reaction: conflict is at the very root and source of life, in fact it is the very stuff out of which life is made: each problem, as presented by the symptoms, contains the indications for its own solution: every disease must be both somatic and psychic: no understanding of the psychic symptoms can be reached, however, without including the unconscious factors: the neglect of the unconscious has been the great defect of psychology in the past: just as the symptom must contain both a somatic and a psychic

component so, in view of the oneness of the organism and its environment, must it contain an environmental as well as an organismal factor: activity is a function of the situation rather than a function of instincts in any animistic sense: accidents are occurrences due to causes outside our system or in a dimension with which we are unfamiliar.

CHAPTER X

The Language of Disease

In language the whole intellectual and moral essence of a man is to some extent revealed. "Speak, and you are" is rightly said by the Oriental. The language of the natural man is savage and rude, that of the cultured man is elegant and polished. As the Greek was subtle in thought and sensuously refined in feeling—as the Roman was serious and practical rather than speculative—as the Frenchman is popular and sociable—as the Briton is profound and the German philosophic—so are also the languages of each of these nations.—*D. Jenisch.*

Language, in the broadest sense, might include all ways of communication; not only words and sentences but gestures as active ways, and postures, facial expression, bodily make-up and anything that throws light on the character of the individual as passive ways. For example, the correlation of bodily make-up with mental type is a very old

problem and is still being worked at, recently in a very illuminating way.[1] The language to which I refer in this chapter, however, is the spoken language primarily.

In the first place we should bear in mind that language was developed by man in his relations with other men, that it is essentially a mode of social action, a form of behavior rather than, as is so frequently supposed, an instrument for reflection or thought. As a mode of action, a form of behavior, therefore, it is important as presenting a part of the symptomatology of disease. Just as fever reflects the reaction, or rather indicates the behavior of the temperature regulating apparatus to certain conditions, particularly infections, so language reflects the reaction of the individual to certain psychological and social conditions, and as we would learn very little about our patients if we consulted the thermometer alone so we will learn very little if we just listen to the words they

[1] E. Kretschmer: *Physique and Character*, New York, 1925, Harcourt, Brace & Co., Inc.

utter. Malinowski[2] says, apropos of the function of language

> It is not correct to regard language as a mere residuum of reflective thought. And the conception of speech as serving to translate the inner processes of the speaker to the hearer is one-sided and gives us, even with regard to the most highly developed and specialized uses of speech, only a partial and certainly not the most relevant view.
>
> To restate the main position arrived at in this section we can say that language in its primitive function and original form has an essentially pragmatic character; that it is a mode of behavior, an indispensable element of concerted human action. And negatively: that to regard it as a means for the embodiment or expression of thought is to take a one-sided view of one of its most derivate and specialized functions.

The oneness of body and mind, the organism-as-a-whole concept, and the interrelations between the organism and its environment, particularly the social environment, constitute an irreducible minimum of considerations that must be borne in mind

[2] Bronislaw Malinowski: *The Problem of Meaning in Primitive Languages* being Supplement I in Ogden and Richards: *The Meaning of Meaning.*

if we are to arrive at any comprehensive idea of the patient and his illness.

When we come to listen to what the patient has to say with an attitude based upon such an understanding of the human being, and only then, will we begin to understand him. This understanding of what the patient says, however, is no easy matter. It will be worth while, therefore, to examine some of the more important aspects of language from the point of view of trying to understand it.

First as to the importance of the situation I will again quote Malinowski:[3]

> A statement, spoken in real life, is never detached from the situation in which it has been uttered. For each verbal statement by a human being has the aim and function of expressing some thought or feeling actual at that moment and in that situation, and necessary for some reason or other to be made known to another person or persons—in order either to serve purposes of common action, or to establish ties of purely social communion, or else to deliver the speaker of violent feelings or passions. Without some imperative stimulus of the moment, there can be no spoken statement. In each case, therefore, utterance and situation are bound up

[3] *Loc. cit.*

inextricably with each other and the context of situation is indispensable for the understanding of the words. Exactly as in the reality of spoken or written languages, a word without *linguistic context* is a mere figment and stands for nothing by itself, so in the reality of a spoken living tongue, the utterance has no meaning except in the *context of situation.*

The next important point about the language of disease is the fact that through the interpretation of the language, its translation, an insight may be gained into the unconscious motives of the patient. Professor Freud has suggested somewhere in his writings that there is an intimate connection between becoming consciously aware of something and the ability to express oneself in words. In other words, as I would put it, the word is the ticket of admission of the unconscious motive to consciousness. Therefore, if we can understand all that the word implies we can gather something of that unconscious motive. This is all matter for the psychoanalysts and I will not discuss it further.

Then there is the whole subject of abstrac-

tion. This is by far too involved a philosophical subject[4] to discuss in detail but I can briefly set down the principle which governs in the interpretation of the language of disease. Here again we are dealing with dimensionality. Disease tends to bring about a certain amount of regression. In fact regression is a movement that makes for recovery just as biologically protoplasm that dedifferentiates is the sort of protoplasm that rejuvenates. As dedifferentiation precedes rejuvenation or reproduction so does regression precede cure. This means that the language of the sick is motivated from sources that lie further back along the path of dedifferentiation and regression than the language of the well. The sick person tends to become dependent and childlike and to wish for and demand the care and treatment accorded a child. His language, therefore, characteristically displays this infantile, dependent quality as one of its components.

[4] See Ernst Cassirer: *Substance and Function*, Chicago, 1923, The Open Court Publishing Co.

This is obvious in the mentally ill. The delusions and incoherences of the psychotic which for so many years have been put down as just nonsense are beginning to yield their meanings to our continuous efforts at interpretation so that when a patient says he has no legs, or is being poisoned, we have some idea of the meaning that really lies behind these cryptic utterances.

Similarly the irritability, unreasonableness, fault finding, complaining, apprehension, doubt, peculiar mannerisms, and many other characteristics of the physically sick need to to be interpreted to be understood for they cannot be taken at their face value, they do not mean what they appear, on superficial observation, to mean. These patients are talking in a different dimension, their language is conditioned by motives which we know little or nothing of in ourselves because we do not need them or have not been thrown back to the necessity of their use. Their language must literally be translated if we are to understand them.

Generally speaking we might say that the diseased employ a language which corresponds to thinking, to concepts that are at a lower level, or at least of a different order of abstraction. Just as one cannot measure apples by a foot-rule nor describe books in terms of Turkish rugs so the language of disease is not susceptible of a literal, word for word translation into the language of the well. A translation of what the sick person is trying to convey in what he says is quite the same sort of process as the translation of a primitive language. To give some idea of what those principles are and just what I mean I will quote Malinowski,[5] who says of the translation of primitive tongues,

> But the object of a scientific translation of a word is not to give its rough equivalent, sufficient for practical purposes, but to state exactly whether a native word corresponds to an idea at least partially existing for English speakers, or whether it covers an entirely foreign conception. That such foreign conceptions do exist for native languages and in great number, is clear. All words which describe the native social order, all expres-

[5] *Loc. cit.*

sions referring to native beliefs, to specific customs, ceremonies, magical rites—all such words are obviously absent from English as from any European Language. Such words can only be translated into English, not by giving their imaginary equivalent—a real one obviously cannot be found—but by explaining the meaning of each of them through an exact ethnographic account of the sociology, culture and tradition of that native community.

With our sick patients we must remember that they are trying to express how they feel and nothing is more difficult, as witness the extreme paucity of the language of the emotions. There are no words that adequately convey meaning in this sphere of human experience. Language is essentially a social necessity, it grew up in order to enable people to *act* together. In fact it might be said to be only a series of ingenious dexterities that enable us to get on with one another sufficiently well only to have survival value.

To quote further from Malinowski.[6]

The ethnographic view of language proves the principle of Symbolic Relativity as it might be called, that

[6] *Loc. cit.*

is that words must be treated only as symbols and that a psychology of symbolic reference must serve as the basis for all science of language. Since the whole world of "things-to-be-expressed" changes with the level of culture, with geographical, social and economic conditions, the consequence is that the meaning of a word must be always gathered, not from a passive contemplation of this word, but from an analysis of its functions, with reference to the given culture. Each primitive or barbarous tribe, as well as each type of civilization, has its world of meanings and the whole linguistic apparatus of this people—their store of words and their type of grammar—can only be explained in connection with their mental requirements.

These hints from Malinowski that I have introduced indicate just how the meaning of a symbol must be arrived at from an understanding of its functional significance and not from the point of view of the widely diffused misconception that, in some way, words are things. A word is a function of the situation and its meaning can only be understood by viewing it as such.

Words are not things. They are only symbols.[7] Neither the perception of red

[7] See my paper *The Language of Schizophrenia*.

nor the word red has any similarity with a certain rate of ethereal vibrations and while there are innumerable men in the world there is no object that corresponds to the abstract term man. This brings us to a consideration of what I term levels at which language is used or what Korzybski[8] would call orders of abstraction. I will illustrate. An automobile comes sailing down the avenue until, at a cross street, a red light flashes and it instantly stops. Now if it so happens that there is not another machine in sight before or behind or on either side in the cross street, the driver might think it would be all right for him to go ahead against the red light. From his point of view as there is no risk of a collision there is no reason why he should not. But from the point of view of the traffic director the matter is quite otherwise. He appreciates that, to give individual drivers the right to use their personal discretion would destroy the operation of the traffic

[8] Alfred Korzybski: *Manhood of Humanity*, New York, 1921, E. P. Dutton & Co.

rules and throw everything back in the sort of confusion that the rules were made to avoid. The one view is personal and relatively concrete, applying to the particular instance: the other view is social and relatively abstract and of general application. The same words are used in both instances such as "right to disregard signal" but being used in absolutely different settings they function to express entirely different situations. They are used at different levels or they express different orders of abstraction. We are constantly using words in one way, at one level, that are interpreted in another way, at another level, and this misuse of words leads to endless confusion in our ordinary discourse and in our scientific discussions. It is as if we were to try and measure the amount of water in a pail by a foot rule instead of a quart measure or vice versa, or to describe books in terms of bricks. The fact that the same words are often used is one of the factors that lead to the confusion. It is an instance of the "magic of words."[9]

[9] See Ogden and Richards: *The Meaning of Meaning.*

It is the magic of words that has had something, at least, to do with our rigid conceptions of health and disease. It is as if the words were things and there were such things as health and disease, clearly and definitely defined and distinct one from the other. But just as I have said there were healths as well as diseases so disease is not a fixed and definite thing but is relative, dependent on circumstances, on the situation. A person may have a limited cardiac capacity which will not permit him to do heavy labor but this does not mean that he cannot do light work and that when so engaged his heart will not function all right. This means that his heart is diseased if great stress is put on it, for then it fails to function efficiently, but it is well for lighter loads because then it functions quite satisfactorily. We see this variation often in mental disorder. An individual who has broken mentally under the stress of severe life conditions will settle down to a perfectly comfortable state of mind after a short residence in a hospital.

Because he is well in the hospital it does not mean that he is therefore able to go out and efficiently take on the burdens he previously broke under. Here it is a question of strength of material quite as in the case of, say, a rope. A given rope will support just so much weight and no more. If more is added it breaks. It is the same with the material of which the human organism is composed. Exceed the limits of adjustment in the demands made upon it and something gives way. The symptoms resulting from the break are the symptoms of disease but here we see clearly that disease is not a thing: it is only an expression of the relation between stress and strength of material.

To summarize: Language is fundamentally a form of social behavior rather than an instrument for reflection: as such it presents a part of the symptomatology of disease: language is a function of the situation: the interpretation of the language of the patient is an important way of getting at his unconscious motives: disease tends to bring

about regression as a step toward ultimate recovery: the language of disease therefore discloses regressive elements: the language of the sick is in a different dimension than the language of the well, it springs from a different level of organization: the language of disease is of a different, usually lower, order of abstraction: the language of the emotions is extremely poor: words are symbols and their meaning must be arrived at by an examination of their functional significance: words are not things, the frequent treatment of them as things is responsible for much faulty reasoning and thinking: the use of the same symbols but at different levels leads to misinterpretation, this is particularly true of the language of the sick which is characteristically motivated at a different level from that of the well and therefore is misunderstood: the rigid concepts held of health and disease are due to the "magic of words:" disease like health is a relative matter.

CHAPTER XI

Summary

Can the practical life really be lived without answering the recondite questions of philosophy? Are the riddles of the Sphinx the idle pastime of deluded fancy? Does the wise man turn his back upon them and go his way, his ears sealed against them as against the allurements of the Siren. This is, alas, impossible. The Sphinx is seated in the soul of each man, and though we endeavour to be deaf, their penetrating sounds, more subtle than the Siren's song, will search us out and ask—What then art thou?—*F. C. S. Schiller: Riddles of the Sphinx.*

Believing with Lotka[1] that the function of science is "to observe phenomena and to describe them and the *relations between them*" and that the function of philosophy is "the critical examination *of the fundamental data of experience*" and that "philosophy is not something apart from science, but must

[1] Lotka: *loc. cit.*

form an integral and essential part of every science" and that "no science can be said to have reached the adult stage until critical examination of its fundamental concepts has at least begun," I have undertaken an examination of the most fundamental concept of medicine; namely, the concept "disease."

Philosophy is, after all, but a way of thinking about problems on a higher level than the way of thinking of any individual science because it aims at correlating the conclusions of the several sciences and focussing the results of such correlation upon the problem in hand. This I have endeavored to do in order to illuminate the problem of disease, drawing, in the main, from the fields of physics, chemistry, biology, psychology, sociology and philology.

In order to proceed with this correlation it was necessary to relate the conclusions of all of these several sciences in terms of a common component and this common element I have sought in the concept of energy.

The difficulty with the use of energy as the

common factor is that it is not so generally accepted due largely to the fact that psychological events are not capable of measurement in terms of energy and so, by many, are supposed on this account to fall outside the possibility of inclusion. Such a difficulty, however, need not be final for if the results of such an attempt are useful then the attempt has sufficiently justified itself.

The great value of this use of the energy concept is that it permits, in a most fruitful way, the consideration of relations which modern scientific thought holds of such great importance, and, too, the dynamic as opposed to the static quality of all relations which is a no less important correspondence with the most recent ways of thinking. From this point of view the organism is not a "thing," it is an "event," in fact there are no longer "things" in the old way of thinking. The paper weight on my desk is not a "thing" it is "something happening," for it is the simplest fact of physics that it is composed of universes of revolving electrons and is in

constant exchange of energy values with its surroundings.

The energy concept certainly permits us to visualize the various factors of our problem and see them thus as events rather than as clearly limited, definitely defined and static "things." If we undertake to compare the characteristics of physical energy with the phenomena of the psyche we shall be struck by the closeness of the analogy in many respects. Tansley[2] does this as follows:

> Meanwhile we recognize many of the characteristics of physical energy in the ebb and flow, the storage and expenditure, of the energy of the mind. The outrush of energy passing into motor action when a simple instinct is excited and there are no barriers to its response; the locking up and gradual increase of energy in a complex actuated by a great instinct, but denied outlet in action; the efforts of the energy to escape by all sorts of side channels, or through weak points in the barriers to action; the tendency of energy to follow the line of least resistance; its possible diversion into other channels by the building up of mechanisms represented by an elaborate complex, closely parallel with the "harnessing"

[2] A. G. Tansley: *The new Psychology and Its Relation to Life*, New York, 1920, Dodd, Mead and Company.

of physical energy to do prescribed work through a machine constructed for that definite end; the wasteful use of psychic energy when the mind is "working against the grain," so that a sense of strain is developed and a large amount of energy is dissipated in "friction," often showing itself in irritable outbursts, comparable with its similarly wasteful use in an unskilfully constructed machine where a large part of the source of energy is used up in friction and the production of useless heat—all these are characteristics alike of the psychic energy of the mind and of the behaviour of physical energy in any mechanical system.

This parallelism is certainly striking and seems to me to warrant the use of the energy concept even though we cannot justify it by the acid test of the physicists. The parallelism may be illustrated further. Tansley goes on to say:[3]

In the purely mental sphere the tendency to seek and maintain equilibrium is seen in the desire for mental unification, which shows itself in rationalization, projection, and allied phenomena, and more generally in the construction and acceptance of unified systems of religion and philosophy. The unifications constructed may be false unifications, but the tendency represented is inevitable.

[3] *Loc. cit.*

Professor Freud in his treatment of the mental mechanisms constantly uses terms that signify energy, particularly such terms as dynamic and, in his metapsychology, the term economic, to describe "the task of mastering the distribution of the quantities of excitation," while such terms as cathexis distinctly imply an energy charge.

The nineteenth century materialism, which involved not only a materialistic conception of life but a mechanistic conception, implied that every reaction to a stimulus was dependent upon a developed mechanism intended for just that purpose. Aside from the fact that, considering the number of possible stimuli, this gets us rapidly into the position of assuming a mechanism with practically infinite possibilities, the difficulties of accounting for such a complex mechanism become more than embarrassing when we see adequate responses in situations that have never before been experienced and to stimuli never before received and for which, therefore, the organism could not conceivably

have developed an adequate mechanism. It has been suggested[4] that what really happens is that the energy system of the organism is acted upon by the energy of the stimulus and the resulting reaction is the result of the flow of energy toward an equilibrium. Köhler gives an excellent example to illustrate this concept. The old way of steering an ocean liner was to move a rudder, perhaps twenty feet square, by powerful motors operating through heavy chain connections. Now a very small section is cut out of the rudder, so small as to be easily movable. This is moved and by destroying the equilibrium on the two sides of the rudder the force of the water impinging on the rudder turns it. In other words, the result is effected in the course of reëstablishing a state of equilibrium that had been disturbed. The reaction of the ship is to change its course in order to get back to equilibrium and requires no elaborate and special mech-

[4] Prof. Wolfgang Kohler: *Biology and the Principles of Physics.*

anism for such specific response. Professor Ritter has suggested that the neuroses were means for minimizing the waste of energy incident to the conflict, or, in accordance with Professor Kohler's illustration efforts at the reëstablishment of an equilibrium effected, according to Professor Freud, on the principle of economy.

The value of such a unifying concept, as I believe the energy concept to be, lies in its capacity for bringing diverse facts under a common principle, thus simplifying their consideration. For example Lotka says:[5]

> When we say that a soap bubble, for example, *tends* to contract under surface tension, or perhaps when we use even less guarded language and say that it is *trying* to contract, our terms are commonly thought reprehensible as being more picturesque than scientific. Yet we ought to be prepared for the conception that the straining of the bubble to contract may not be so fundamentally different a thing from the straining of an amoeba to engulf a food particle, or the straining of a Newton to assimilate a new conception or to solve a problem in philosophy. The two phenomena may be

[5] *Loc. cit.*

far separated, indeed, upon the scale of evolution, yet they may be two rungs upon the same scale.

Let me add an illustration from pathology which seems to me to be on all fours with this comparison of Lotka's. We know that fibroid tumors of the uterus are more frequent in women who have never borne children and we have long thought that there must be some connection between sterility and their cause. Using the same sort of language used by Lotka in the above illustration and visualizing the situation in terms of energy—Is it too much to say that the tumor is the best result the uterus is able to obtain under the circumstances in its efforts to bring forth a child? Can we not visualize the uterus as straining to fulfil its biological function and so finally, as a result of the determination of energy in this direction causing added growth and a tumor, which is the caricature of a child? If this example seems too speculative the dermoid cyst with its content of hair, bone, and teeth surely presents the appearance of a frustrated effort at reproduction.

Disease, looked at from any angle we will, whether we view it as failure of adaptation or adjustment to the environment, whether as failure to measure up to internal standards of conduct—ego-ideals—whether it represents an inadequate integration of the organism or an inadequate integration of the individual as a social unit, however we view it it presents itself as inadequacy of some sort. This inadequacy may be organ inadequacy, mind inadequacy, social inadequacy but inadequacy it seems always to be and inadequacy expressed in terms of our energy concept must mean that the energy has been stepped down by disease to a lower tension, to a lower level of efficiency, it must mean in the last analysis that disease is coterminous with the degradation of energy.

From this point of view all processes that lead to the degradation of energy are on the path that leads to death and all those that lead the energy in the opposite direction are in the pathway of life. Obviously both proc-

esses are at work simultaneously in every organism so that the state of that organism at any particular time is due to the balance between them that then maintains.

In this discussion, however, death means always the death of the individual and as already indicated the individual is but a branch, so to speak an offshoot from the immortal main stem of the tree of life represented by the germ plasm, and only represents the possibilities of the germ plasm at this particular point for specialization and differentiation under the limitations imposed by the environment.

Now Child has particularly emphasized[6] and elaborated the fact that rejuvenescence or reproduction is preceded by dedifferentiation: that the cells from which new individuals are produced have either dedifferentiated or have not participated in the processes of differentiation and specialization as have the other cells of the body.

From this point of view the death of the

[6] *Senescence and Rejuvenescence.*

individual is the necessary result of the process of individuation while the life of the phylum goes steadily forward, having brought to it the results of the experiments of the individuals but preserving only those that have survival value and discarding the others. This, of course, in a modified form, means the inheritance of acquired characters and the necessity of the death of the individual for the perpetuation of the life of the race.

There seems to be another meaning of perhaps as great significance, certainly of prime significance for medicine. If disease is coterminous with the degradation of energy then disease also implies the process of dedifferentiation. Disease is always regressive. This would indicate that disease processes are seeking that source of energy which resides in the undifferentiated, because not yet dissipated in differentiation, and therefore might as well be regarded as the symptoms of the way in which the organism is attempting to effect a cure, or, in other

words, to reach a state of energy equilibrium. This is an additional reason to that already given, based upon the law of action and reaction, why, if we could read the symptoms of disease in all the fullness of their meaning, we would be able to see that each disease presents in its symptoms the formula for its cure, if not the cure of the individual then the cure of the race.

In this inquiry into the nature of disease I have endeavored to break down the rigidity of the concept as it has in the past been held, to dismember it and to examine the parts of which it is composed. In this effort I have, as indicated in the Preface, felt free to use speculation, hypothesis, and theory freely as tools of thought and by so doing have arrived at a number of conclusions of varying degrees of probability which I have presented in the summary attached to each chapter and which, so far as they relate to the nature of disease, I will now reproduce here.

The conclusions that we have come to in this inquiry respecting the nature of disease

are as follows: disease and health are relative terms: in order to understand the nature of health and disease we must decide on just how we are to approach a study of the human organism in order to understand it in such a way as will be useful for the inquiry in hand: every disease has a psychic component: the pattern of the organism is a pattern of somatic structure and of energic investiture: the concept of energic investiture is important for the comprehension of disease: problems of adjustment require redistributions of energy and the new stresses developed by this redistribution may cause disease: states of dynamic imbalance however produced, either by adding energy or by subtracting it, impair the ability to adjust adequately: there are beneficent as well as malignant aspects of disease: disease is a failure of adaptation both to conditions without the organism and to conditions within: disease is a form of partial activity: the history of the organism is a continuous conflict between two sets of tendencies, one making for life, the other

making for death: death may involve any part of the organism or be of any degree so that as we have many diseases so we have, in the same sense, many healths, as we have many deaths so there are many lifes: any manifestation of energy which makes for the destruction of the organism is in the direction of death and the symptoms of disease are the signs of the reaction of the organism to the particular noxa: symptoms therefore present indications of beneficent effort or action: consideration of the problems of life and death disclosed reasons for regarding the ego-instinct as tending in the direction of death and the sex-instinct as tending in the direction of life: when function which has become structuralized becomes disordered we are dealing with organic disease: when function which has not become structuralized becomes disordered we are dealing with functional disease: chemical transportation, synapse choice and affect are the elements in the threefold constitution of functional disease: the common element here is the affect:

on the principle that the higher contains the lower psychotherapy is the rational approach to functional disease: diseases are not entities: the classification of diseases is purely a matter of convenience: what are known as diseases are the results of what happens when the organism comes in contact with inimical agents: the signs and symptoms of this conflict arrange themselves on the side of either life or death: all symptoms may be grouped in pairs of opposites in accordance with the law of action and reaction: each problem, as presented by the symptoms, contains the indications for its own solution: every disease must be both somatic and psychic: no understanding of the psychic symptoms can be reached, however, without including the unconscious factors: just as the symptom must contain both a somatic and a psychic component so, in view of the oneness of the organism and its environment, must it contain an environmental as well as an organismal factor: accidents are occurrences due to causes outside our system

or in a dimension with which we are unfamiliar: language presents a part of the symptomatology of disease: the interpretation of the language of the patient is an important way of getting at his unconscious motives: disease tends to bring about regression as a step toward ultimate recovery: the language of disease therefore discloses regressive elements: the language of the sick is in a different dimension than the language of the well, it springs from a different level of organization: the language of disease is of a different, usually lower, order of abstraction: the use of the same symbol but at different levels leads to misinterpretation, this is particularly true of the language of the sick which is characteristically motivated at a different level from that of the well and therefore is misunderstood: the rigid concepts held of health and disease are due to the "magic of words:" disease like health is a relative matter: disease processes imply the degradation of energy and the process of dedifferentiation: disease is regressive: disease is an attempt at energy equilibrium.

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Sans Tache

Sans Tache

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